

FORT MYERS BEACH WRF INJECTION WELL IW-1 REHABILITATION AND MIT

Project Technical Specifications
100% DESIGN - ISSUED FOR BID

BV PROJECT NO. 419533

WACS FACILITY ID: 75497

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PREPARED FOR

PROFESSIONAL ENGINEER
GENERAL, MECHANICAL

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NO. 67272



Lee County Utilities

19 AUGUST 2024

**LEE COUNTY UTILITIES
FORT MYERS BEACH WATER RECLAMATION FACILITY
INJECTION WELL IW-1 REHABILITATION AND MIT
TECHNICAL SPECIFICATIONS**

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PART 1 GENERAL

1.01 CONTRACT PLANS/DRAWINGS

- A. Contract plans, also referred to as Drawings, are listed below, dated June 2024 and any subsequent revision thereto introduced by Addenda prior to negotiations, showing the work of the Contract are hereby made a part of the Contract Documents and are listed as follows:

**LEE COUNTY UTILITIES
FORT MYERS BEACH WRF
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<u>Sheet No.</u>	<u>Title</u>
G-00	COVER SHEET
G-001	DRAWING LIST, GENERAL NOTES, AND LEGEND
M-01	WELLHEAD RETROFIT DETAIL
M-502	INJECTION WELL DETAIL

- B. Due to the possibility of typing errors or omissions, the above list shall not be considered as necessarily complete, nor shall the Standard Details which may be included elsewhere herein be considered as forming a complete listing of all Standard Details which may apply to this Project. Perform all work shown on all sheets of the Plans, as specified herein or necessary for a complete functional installation and no extra compensation will be made due to the omission or incorrect listing of a Drawing in this Section. All County Standard Details are incorporated in these Contract Documents by reference and all work shall be performed in accordance with all applicable County Standard Details.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description of Work
- B. Qualifications of CONTRACTOR
- C. Constraints
- D. Work by Others
- E. CONTRACTOR's Use of Site
- F. Work Sequence
- G. Owner Occupancy
- H. Outage Plan and Requests

1.2 DESCRIPTION OF WORK

- A. General: The Work to be done under this Contract consists of the installation and cementing of a liner (11.75-inch inside diameter carbon seamless steel casing, 0.5-inch wall thick) and all necessary above surface modifications necessary to connect the downhole piping to the existing above ground wellhead and piping as shown and specified in Contract Documents titled "Lee County Utilities Fort Myers Beach WRF Injection Well IW-1 Rehabilitation and MIT", also referred to as Drawings, dated August 2024 and any subsequent revision thereto introduced by Addenda prior to negotiations. The Work to be done under this Contract will be done at the Fort Myers Beach Water Reclamation Facility, also referred to as Site, located at 17155 Pine Ridge Rd, Fort Myers Beach, Florida 33931. The Work to be done under this Contract terminates at the tee connection of the permanent wellhead in accordance with the Drawings. Permanent piping and concrete pads are not included in the work of this Contract.
- B. The Work includes:
 - 1. Furnishing of all labor, material, superintendence, plant, power, light,

heat, fuel, water, tools, appliances, equipment, supplies, services, and other means of construction necessary, or proper for performing and completing the Work.

2. Sole responsibility for adequacy of plant and equipment.
 3. Maintaining the Work area and Site in a clean and acceptable manner.
 4. Maintaining existing facilities in service at all times except where specifically provided for otherwise herein.
 5. Protection of finished and unfinished Work.
 6. Repair and restoration of Work damaged during construction.
 7. Furnishing as necessary proper equipment and machinery, of a sufficient capacity, to facilitate the Work and to handle all emergencies normally encountered in Work of this character.
 8. Furnishing, installing, and protecting all necessary guides, track rails, bearing plates, anchor and attachment bolts, and all other appurtenances needed for the installation of the devices included in the equipment specified. Make anchor bolts of appropriate size, strength and material for the purpose intended. Furnish substantial templates and shop drawings for installation.
- C. Implied and Normally Required Work: It is the intent of these Specifications to provide the OWNER with complete operable systems, subsystems, and other items of Work. Any part or item of Work which is reasonably implied or normally required to make each installation satisfactorily and completely operable is deemed to be included in the Work and the Contract Amount. All miscellaneous appurtenances and other items of Work incidental to meeting the intent of these Specifications are included in the Work and the Contract Amount even though these appurtenances may not be specifically called for in these Specifications.
- D. Quality of Work: Regard the apparent silence of the Contract Documents as to any detail, or the apparent omission from them of a detailed description concerning any Work to be done and materials to be furnished as meaning that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. Interpretation of these specifications will be made upon this basis.
- E. The Specifications included in these Contract Documents establish the minimum performance and quality requirements for materials and equipment together with the minimum standards for quality of workmanship and appearance. Generally, there has been no attempt to separate the

Specification sections into groups for the work of separate SUBCONTRACTORS, or for work to be performed by the various trades. Should there be any question as to the interpretation of any particular Specification Section or part of Specification Section, such questions should be directed to the OWNER prior to the submittal of a proposal for the Work under this Contract.

- F. It is the intent of the OWNER to obtain a complete functional, and satisfactory installation under this Project, and any items of labor, equipment or materials which may be reasonably assumed as necessary to accomplish this end shall be supplied whether or not they are specifically shown on any plans which may be supplied or stated herein. The CONTRACTOR shall provide all materials for the Project unless they are specifically called out in these specifications as being supplied by the OWNER. The CONTRACTOR shall also supply all sheeting, shoring, bracing and all other labor, material or equipment required to preclude damage to, or loss of functionality of, any existing facility or system.
- G. No request for additional compensation or Contract time resulting from encountering utilities or structures not shown, or differing in location or elevation from that shown, will be considered. The CONTRACTOR shall explore sufficiently ahead of the Work to allow time for any necessary adjustments without delay to the progress of the installation. Costs due to delays caused by encountering underground utilities or structures which could have or should have been discovered by timely exploration ahead of the Work shall rest solely with the CONTRACTOR.

1.3 QUALIFICATIONS OF CONTRACTOR

- A. The CONTRACTOR shall submit the name of the proposed Superintendent, Driller, Geophysical Logger, and detailed information identifying the above mentioned and as well as all personnel to be utilized on this Project and written evidence with respect to the following:
 - 1. Personnel Requirements
 - a. All employees shall be First Aid and Cardiopulmonary Resuscitation (CPR) certified.
 - b. All Superintendents and Drillers OSHA Outreach 30-hour and HAZWOPER 24-hour certified.
 - c. Superintendents, Drillers and Geophysical Loggers' resumes must be submitted and approved before commencement of work and shall be updated throughout the life of the Project. General requirements shall include but not be limited to experience drilling deep injection wells in the State of Florida.

- d. Geophysical Logging Firm: All geophysical logs shall be performed by a company licensed and experienced in the performance and interpretation of such logs. The geophysical logging firm and the personnel must be pre-approved by the ENGINEER.
 - e. The CONTRACTOR must hold a license from the Florida Department of Health Bureau of Radiation Control for the required geophysical logging that will be performed under this Contract; the driver of the logging vehicle shall have a Commercial Driver's License with an 'H' endorsement for radioactive material. The logging vehicle shall be a licensed, placated Florida Department of Transportation (FDOT) vehicle for the transportation of radioactive material.
- B. The latest versions of Lee County Construction Code, Chapter 489 of the Florida Statutes, and the rules of the State of Florida Department of Professional Regulation shall govern the qualification for the CONTRACTOR and SUBCONTRACTORS. No CONTRACTOR or SUBCONTRACTOR shall be required to possess any other professional designation or affiliation in order to be eligible to bid on this Project, except those stated in this solicitation. Unless prohibited by law, nothing shall prevent the OWNER from requiring proof of sufficient expertise and skill to qualify for the subject Project.
- C. CONTRACTORS are directed to **Section 01 33 00 – Submittals** for more information and additional submittals required for this Solicitation. CONTRACTOR shall submit to the ENGINEER the following information as part of the bid package, but not limited to references, resumes, list of equipment, list of SUBCONTRACTORS, and other information required by this solicitation.
- 1.4 SUBCONTRACTORS: All SUBCONTRACTORS must be approved by OWNER and identified on all bid documents. Prior to commencing any work, CONTRACTOR shall provide OWNER with a list of all proposed SUBCONTRACTORS. Any SUBCONTRACTORS not previously approved by OWNER must obtain approval by submitting an approved contractor variance form to OWNER. SUBCONTRACTORS shall not begin any work until Written Approval is received from OWNER.

All SUBCONTRACTORS shall meet the same insurance requirements as CONTRACTOR. CONTRACTOR is responsible for ensuring all SUBCONTRACTORS comply with project safety requirements and guidelines.

1.5 CONTRACTOR'S USE OF SITE

- A. In addition to the requirements of the General Conditions, limit use of Site and premises for work and storage to allow for the following:
1. Coordination of the Work under this CONTRACT with the work of the other contractors where Work under this CONTRACT encroaches on the Work of other contractors.
 2. OWNER occupancy and access to operate existing facilities.
 3. Coordination of Site use with ENGINEER.
 4. Responsibility for protection and safekeeping of products under this CONTRACT.
 5. Providing additional off-Site storage at no additional cost to the OWNER as needed.
 6. The CONTRACTOR's use of the Site shall be limited to its construction operations, including on-Site storage of materials, on-Site fabrication facilities, and field offices.

1.6 WORK SEQUENCE

- A. Construct Work in stages to accommodate OWNER's use of premises during construction period and in accordance with the limitations on the sequence of construction specified. Coordinate construction schedules and operations with ENGINEER.
- B. Coordinate Work of all subcontractors.
- C. General:
1. The CONTRACTOR and the ENGINEER may discuss and mutually agree to conduct one or more of the steps described on this sequence in a different order (either advance or defer a task). In the event that one or more of these agreements are reached, this shall not warrant or require a Change Order to the Contract under any circumstance and shall be done at no additional cost the OWNER.
 2. Construction activities shall be scheduled and sequenced to ensure continuous operation of the existing treatment facilities. The CONTRACTOR's scheduling shall develop construction sequencing so that the WORK will not adversely impact the quantity or quality of treatment. The CONTRACTOR shall be responsible for the development of the construction sequencing.

3. CONTRACTOR shall submit, revise/correct and complete to the satisfaction and approval of the ENGINEER, the Project Baseline, Construction Schedule, and Project Schedule of Values. CONTRACTOR shall not commence work until the Base Line Construction Schedule has been approved.
 4. The CONTRACTOR shall mobilize at the locations designated by the ENGINEER on the Site. The Mobilization shall include designation of the CONTRACTOR's Project Management and Supervisory personnel.
 5. CONTRACTOR shall submit and correct as to the approval and satisfaction of the ENGINEER, a submittal log with all Submittal Data and Shop Drawings for all long lead material and equipment items which, in the opinion of the ENGINEER, need immediate submission for coordination, timely fabrication and/or delivery.
 6. Apply for and obtain all necessary Permits as required or necessary to complete the Work.
 7. The following potential construction sequence is not a requirement of the contract but is provided by the ENGINEER to aid the CONTRACTOR in schedule development.
 8. The listing of schedule constraints below does not mean that every constraint or special condition has been identified. The list does not substitute for the CONTRACTOR's coordination and planning for completion of the WORK within the Contract Times.
 9. The CONTRACTOR is hereby advised that the suggested well sequencing may be changed by the ENGINEER.
 10. All radioactive tracer surveys shall be conducted at the end of the Work, after the injection well has been rehabilitated.
- D. Mobilization and Site Preparation: The CONTRACTOR is hereby advised that the following construction related activities are representative of the Work, but their sequence may be changed by the ENGINEER relative to order of occurrence, or deletion. The proposed Work sequence is as follows:
1. Conduct a pre-construction video survey of the Site to document existing site conditions.
 2. Provide temporary water supply source piping, valving, and appurtenances from existing potable water source as approved by the OWNER. CONTRACTOR shall coordinate temporary water supply source needs with OWNER and ENGINEER for cementing operations and MIT.

3. Mobilize drilling and other required materials and equipment required for construction.
 4. If required, suppress the artesian head pressure in the well.
- E. Well Rehabilitation for one (1) injection well: The CONTRACTOR is hereby advised that the following construction related activities are representative of the Work, but the sequence of events may be changed by the ENGINEER relative to order of occurrence, or deletion, or additional testing that may be added. No rehabilitation on the injection well shall take place until Part 1.6 D., above is complete to the satisfaction of the ENGINEER.
1. Install the 11.75-inch inside diameter (ID) carbon steel seamless casing to approximately 2,370 feet bls in accordance with **Section 33 26 05 – Well Casing** and conduct a standard cement bond log on the casing, before cementing, in accordance with **Section 33 26 06 – Geophysical Logging**.
 2. Cement the 11.75-inch ID carbon steel seamless casing from the bottom of the casing to approximately 300 feet bls in accordance with **Section 33 26 07 - Grouting**. After each cement stage, perform static temperature and natural gamma ray logs to confirm the top of cement in conjunction with measurement from tremie pipe hard tags in accordance with **Section 33 26 06 – Geophysical Logging**. Logging may be waived by the ENGINEER if poor fill-up is encountered.
 3. Conduct a standard cement bond log following completion of cementing of the 11.75-inch ID carbon steel seamless casing to within 300 feet bls in accordance with **Section 33 26 06 – Geophysical Logging**.
 4. Complete cementing of the 11.75-inch ID carbon steel seamless casing following logging in accordance with **Section 33 26 07 - Grouting**.
 5. Conduct internal mechanical integrity testing of the 11.75-inch ID carbon steel seamless casing by performing a casing pressure test in accordance with **Section 33 26 11 – Mechanical Integrity Testing**.
 6. Conduct internal mechanical integrity testing of the 11.75-inch ID carbon steel seamless casing by performing geophysical logging (color video survey) of the casing and injection zone in accordance with **Section 33 26 06 – Geophysical Logging**.
 7. Conduct external mechanical integrity testing of the 11.75-inch ID carbon steel seamless casing by performing a High-Resolution Temperature Log and a Radioactive Tracer Survey in accordance with **Section 33 26 11 – Mechanical Integrity Testing**.

8. Complete installation of wellhead fittings and valves in accordance with **Drawing M-01.**
- F. Final Cleanup and Demobilization
1. Remove drill rig and related equipment from the Site.
 2. Demobilize all remaining equipment and materials, including all temporary piping.
 3. Restore to pre-remediation conditions any landscaping and sod impacted by the CONTRACTOR's work.
 4. Cleanup, property restoration and paving repairs shall follow as closely behind the completion of testing as possible, followed by a final inspection and cleanup when all other work is completed.
 5. Restore Site, walks, asphalt, and concrete paving, to original or better condition.
 6. Perform final cleanup and testing and remove all debris and excess material from Site.
 7. Submit all final Record (As-Built) Drawings along with spare parts, supplies, and tools.
 8. Perform all work required in punch list items as of Substantial Completion.
 9. Request Final Inspection and submit final Requisition for Payment.
 10. While performing the Work in the above-described sequence, all requirements of the Specifications shall be strictly followed. Perform prompt cleanup and removals as the work progresses.

1.7 OWNER OCCUPANCY

- A. OWNER will occupy premises during the entire period of construction in order to maintain normal operations. Cooperate with OWNER's representative in all construction operations to minimize conflict, and to facilitate OWNER usage.
- B. Conduct operations so as to inconvenience the general public in the least.

1.8 OUTAGE PLAN AND REQUESTS

- A. Unless the Contract Documents indicate otherwise, the CONTRACTOR shall not remove from service, de-energize, or modify settings for any existing operating tank pipeline, valve, channel, equipment, structure, road, or any other facility without written permission from the OWNER.

- B. Where the Work requires modifications to existing facilities, construction of new
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facilities and/or connection of new facilities to existing facilities, the CONTRACTOR shall submit a detailed outage plan and schedule for the OWNER's and ENGINEER'S approval a minimum of two (2) weeks in advance of the time that such outage is required.

- C. A completed System Outage Request form (blank form furnished by the ENGINEER) shall accompany each outage plan. The outage plan shall be coordinated with the construction schedule and shall meet the restrictions and conditions of the Contract Documents. The outage plan shall describe the CONTRACTOR's method to prevent bypassing of other treatment units; the length of time required to complete said operation; any necessary temporary power, controls, instrumentation or alarms required to maintain control monitoring, and alarms for the treatment plant processes; and the manpower, plant, and equipment, which the CONTRACTOR will furnish for proper operation of associated treatment units. All costs for preparing and implementing the outage plans shall be at no increase in cost to the OWNER.
- D. The ENGINEER shall be notified in writing at least one (1) week in advance of the required outage if the schedule for performing the Work has changed or if revisions to the outage plan are required.
- E. The CONTRACTOR shall provide written confirmation of the shutdown date and time to the ENGINEER two (2) workdays prior to the actual shutdown.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

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

END OF SECTION

SECTION 01 11 60

SAFETY REQUIREMENTS AND PROTECTION OF PROPERTY

PART 1 GENERAL

1.01 CONTRACTOR'S RESPONSIBILITY FOR SAFETY

- A. Conduct required safety protocols and be solely and completely responsible for conditions of the job site, including safety of all persons (including employees) and property during the Contract period. This requirement shall apply continuously and not be limited to normal working hours.
- B. Neither the Professional activities of the Design Professional, nor the presence of the Design Professional nor employees and subconsultants at a construction site, shall relieve the CONTRACTOR and any other entity of their obligations, duties and responsibilities including but not limited to, construction means, methods, sequence techniques or procedures necessary for performing, superintending, or coordinating all portions of the Work of construction in accordance with the Contract Documents and any health and safety precautions required by any regulatory agencies.

1.02 FEDERAL, STATE, AND LOCAL SAFETY REQUIREMENTS

- A. Safety provisions shall conform to the Federal and State Departments of Labor Occupational Safety and Health Act (OSHA), and all other applicable Federal, State, County, and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified in other parts of these Contract Documents. Where any of these are in conflict, the more stringent requirements shall be followed. CONTRACTOR's failure to thoroughly familiarize with the aforementioned safety provisions shall not relieve the CONTRACTOR from compliance with the obligations and penalties set forth therein.
- B. The CONTRACTOR shall be in compliance with all applicable provisions of the Occupational Safety and Health Act of 1970.
- C. For trench excavations in excess of five (5) feet in depth, the CONTRACTOR shall comply with the provisions of the State of Florida "Trench Safety Act", See the Section titled, "Trench Safety Act" of the "Instruction to Contractors".
- D. All open excavations made in the earth shall be performed in compliance with the State of Florida Trench Safety Act, OSHA 29 CFR 1926.650, Subpart P (Chapter 90-96, Laws of Florida). The CONTRACTOR shall appoint a "competent person", in accordance with Subpart P, who shall be present at the job site. A "competent person" shall mean one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

- E. The CONTRACTOR shall familiarize with the Underground Facility Damage Prevention and Safety Act, Florida Statute 556. The CONTRACTOR shall contact the Sunshine State One Call Center at, 1-800-432-4770, forty-eight (48) hours prior to any excavation. Failure to familiarize with the aforementioned safety provisions shall not relieve the CONTRACTOR from compliance with the obligations and penalties set forth herein.

1.03 SAFE ACCESS BY FEDERAL, STATE, AND LOCAL GOVERNMENT OFFICIALS

- A. The CONTRACTOR shall at all times provide proper facilities for safe access to the Work by authorized government officials.

1.04 CONSTRUCTION SAFETY PROGRAM

- A. Develop and maintain for the duration of this Contract, a safety program that will effectively incorporate and implement all required safety provisions. The CONTRACTOR's Manual of Safety Practices outlining the firm's policies on field safety procedures for employees shall be submitted to the OWNER for review before "Notice to Proceed" will be issued. The CONTRACTOR shall appoint an employee who is qualified and authorized to supervise and enforce compliance with the safety program.
- B. Certain products specified in these specifications contain warnings by the manufacturers that under certain conditions, if instructions for use are not followed, a hazardous condition may exist. It is the CONTRACTOR's responsibility to instruct staff in the safe use of the product, or any product substitution.
- C. The duty of the OWNER to conduct construction review of the CONTRACTOR's performance is not intended to include a review or approval of the adequacy of the CONTRACTOR's Safety Supervisor, the safety program, or any safety measures taken in, on, or near the construction site.

1.05 SAFETY EQUIPMENT

- A. As part of the safety program, maintain at an office or other well-known place at the job site, safety equipment applicable to the Work as prescribed by the governing safety authorities, all articles necessary for giving first-aid to the injured, and establish the procedure for the immediate relocation to a hospital or a doctor's care of any person who may be injured on the job site.
- B. Perform all necessary work to protect all personnel and the general public from hazards, including, but not limited to, surface irregularities or unramped grade changes, and trenches or excavations. Furnish barricades, warning lights, traffic cones, temporary fencing, lanterns, proper signs, and personnel, such as flagmen and uniformed Police officers, to safeguard all persons and work.

- C. The performance of all work and all completed construction, particularly with respect to ladders, platforms, structure openings, scaffolding, shoring, logging, machinery guards and the like, shall be in accordance with the applicable governing safety authorities.
- D. During construction, construct and at all times maintain satisfactory and substantial temporary chain link fencing, solid fencing, railings, barricades or steel plates, as applicable, at all openings, obstructions, or other hazards. All such barriers shall have adequate warning lights as necessary, or required, for safety.

1.06 STORAGE OF HAZARDOUS MATERIALS

- A. The CONTRACTOR is hereby cautioned that they cannot store any environmentally hazardous materials such as solvents, greases, lubricants or any other type of chemical substances at the Project site in excess of the quantities needed for immediate use.
- B. There shall be no oil dripping from equipment or oil spills. Oil containing equipment will be inspected daily and will be placed over visqueen or drip pans.
- C. The materials shall be stored and handled in a proper and safe manner and upon its use, immediately dispose of the containers, cans, rags and remnants of the materials in a manner approved by the OWNER at the CONTRACTOR's sole cost. The CONTRACTOR is not allowed to store empty containers at the site. In case of any violation, such violation will be reported to OWNER and the CONTRACTOR shall be subject to all penalties and fines as required by State and County regulations.
- D. Storage Areas and Requirements from the OWNER

The OWNER is responsible for obtaining, preparing and handling manifests for waste as needed for removing hazardous materials from the Site.

In Lee County, because of the need to protect our drinking water supply, many of the storage requirements for hazardous wastes also apply to storing virgin chemicals.

- Containers shall be maintained in good condition, i.e., sound (not damaged). Containers shall be compatible with the hazardous waste stored in them and approved containers shall meet US Department of Transportation standards (DOT).
- Containers holding hazardous waste shall be maintained closed, except when adding to or emptying the container.
- Containers shall bear labels identifying their content as well as the date storage began.

- When stored outside of working bays, used oil containers shall be labeled as such, covered, and equipped with secondary containment.
- Chemical storage areas must be on an impervious surface with secondary containment or a bermed and covered area away from drainage structures (e.g. floor drains or storm drains). This containment area should be able to hold 110% of the volume of the largest single tank/drum to be stored in this area.
- In large storage areas, there must be aisle space between storage products. This will enable inspection of the container for leaks and/or corrosion.
- Incompatible chemicals or materials should be stored separately.
- Provide appropriate signs and markings so that the Hazardous Waste Storage Area may be readily identified.
- Label each container with the type of material in it and in the case of hazardous wastes, use the words "Hazardous Waste."
- All above ground tanks and storage areas for hazardous materials and hazardous wastes shall be stored in covered, secondary containment. Design and construction details require OWNER'S approval.
- Filters and batteries shall be properly stored and disposed of.
- All discharges to sewers shall meet the OWNER'S discharge standards.
- Rags used during mechanical repairs or cleaning processes which become contaminated with waste oil or hazardous materials such as solvents, ink, etc. are considered hazardous wastes and may be handled by an approved rag service or an approved hazardous waste transporter. Used rags must not be disposed of in the trash/dumpster unless a hazardous waste profile indicates otherwise and approval is granted by the OWNER.
- Facilities generating more than 10 spent fluorescent and/or high-intensity discharge (HID) lamps per month must have them recycled. Primarily because of the mercury that they contain, these lamps cannot be disposed of in the regular trash. Spent lamps must be stored in a safe location in order to prevent them from breaking. More information can be obtained from the [FDEP Mercury Program](#).

1.07 ACCIDENT REPORTS

- A. In the event of an emergency requiring immediate attention, 911 emergency services shall be called directly. Following emergency services contact CONTRACTOR shall follow OWNER site medical emergency procedures and report the accident immediately by telephone or messenger to the OWNER Project Representative. In addition, the CONTRACTOR must promptly report in writing to the OWNER all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full details and statements of witnesses.
- B. If a claim is made by anyone against the CONTRACTOR or any

SUBCONTRACTOR on account of any accident, promptly report the facts in writing to the OWNER, giving full details of the claim.

1.08 TRAFFIC SAFETY AND ACCESS TO PROPERTY

- A. Comply with all rules and regulations of the City, State, and County authorities regarding closing or restricting the use of public streets or highways. No public or private road shall be closed, except by express permission of the OWNER. Conduct the Work so as to assure the least possible obstruction to traffic and normal commercial pursuits. Protect all obstructions within traveled roadways by installing approved barricades, signs, and lights where necessary for the safety of the public. The convenience of the general public and residents and the protection of persons and property are of prime importance and shall be provided for in an adequate and satisfactory manner.
- B. Where traffic will pass over backfilled trenches before they are paved, the top of the trench shall be maintained with temporary asphalt that will allow normal vehicular traffic to pass over. Temporary access driveways must be provided where required. Cleanup operations shall follow immediately behind backfilling and the work site shall be kept in an orderly condition at all times.
- C. Supply Flagmen and Guards or Police when they are required by regulation or when deemed necessary for safety. Flagmen and Guards shall be furnished with approved orange wearing apparel and other regulation traffic control devices.

1.09 FIRE PREVENTION AND PROTECTION

- A. Perform all work in fire-safe manner. Furnish and maintain on the site adequate fire-fighting equipment capable of extinguishing incipient fires. Comply with applicable Federal, local, and State fire-prevention regulations. Where these regulations do not apply, applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No.241) shall be followed.

1.10 HURRICANE PREPAREDNESS

- A. During such periods of time as are designated by the United States Weather Bureau as being a hurricane alert, the CONTRACTOR shall perform all precautions as necessary to safeguard the Work and property, including the removal of all small equipment and materials from the site, lashing all other equipment and materials to each other and to rigid construction, and any other safety measures as may be directed by the OWNER.
- B. Upon Notification of a Hurricane Watch
 - 1. Formal notification to all CONTRACTORS to prepare and submit for

approval a Plan of Action for the specific actions to be taken on their particular Projects.

C. Upon Notification of a Hurricane Warning

1. Formal notification to the CONTRACTORS to implement their approved Plan of Action to protect the Project and the public.
2. A copy of the notifications will be provided to the Plant Superintendent. The Plant Superintendent is also requested to notify the Construction Manager of any assistance needed from the CONTRACTOR in order to secure Plant entities.

1.11 JOINT SURVEY TO ESTABLISH AUTHENTICITY OF POSSIBLE DAMAGE CLAIMS

- A. The CONTRACTOR shall maintain vertical and horizontal survey control points on all structures and improvements, located in the vicinity of the work prior to beginning work, and shall periodically check the points for movements with copies provided to the OWNER, of the survey notes for each survey and a copy of the layout of the survey control points.
- B. After the Contract is awarded and before commencement of work, perform a thorough examination of existing buildings, structures, and other improvements in the vicinity of the work, as applicable, which might be damaged by his operations.
- C. Examinations of existing structures, buildings, and other improvements in the vicinity of the work shall be done by the CONTRACTOR. The scope of the examination shall include cracks in the structures, settlement, leakage, and similar conditions. The OWNER assumes no responsibility for pre-existing conditions of the structure.
- D. Records in triplicate of all observations shall be prepared by the CONTRACTOR, photographs shall be taken by the CONTRACTOR signed and dated, with descriptive information and in the manner specified above. One signed copy of every document and photograph will kept on file in the office of the OWNER and the ENGINEER.
- E. The above records are intended to be used as indisputable evidence in ascertaining the extent of any damage which may occur as a result of the CONTRACTOR's operations and are for the protection of the CONTRACTOR and the OWNER, and will be a means of determining whether and to what extent damage, resulting from the CONTRACTOR's operations, occurred during the Contract work.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 22 13

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General
- B. Explanation and Definitions
- C. Measurement
- D. Payment
- E. Schedule of Values

1.2 GENERAL

- A. The CONTRACTOR shall receive and accept the compensation as provided in the Contract full payment for furnishing all labor, materials, tools and equipment, for performing all operations necessary to complete the Work under this Contract. This includes full payment for all loss or damages which may occur where the CONTRACTOR is determined by the OWNER and ENGINEER to be at fault. As requested in writing by the CONTRACTOR, and if approved by the OWNER excessive durations resulting from adverse downhole conditions will be payable at the rate identified for standby time.
- B. The cost breakdown (or schedule of values) referred to herein is defined in the Contract. The cost breakdown (schedule of values) approved by the Engineer will be used as the basis for making progress payments and for determining the cost of extra work which is the same or similar (as determined by the Engineer) to that defined in the schedule of values.
- C. The prices stated in the Bid include full compensation for overhead and profit, all costs and expenses for taxes, labor, equipment, furnishing and repairing small tools and ordinary equipment, mobilization, home office expenses and general supervision, materials, commissions, transportation charges and expenses, patent fees and royalties, bond, insurance, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the Work as shown on the Drawings and specified herein. In addition, CONTRACTOR shall include the actual cost of social security taxes, unemployment insurance, worker's compensation, fringe benefits, inclusive of life and health insurance, union dues, pension, pension plans, vacations, and insurance and CONTRACTOR 's public liability

and property damage insurance involved in the work based on the actual wages paid to such labor and all other general costs and profits, prorated to each item.

- D. It is the intent of the OWNER to obtain a complete and working installation under this Contract, and any items of labor, equipment or materials which may reasonably be assumed as necessary to accomplish this end shall be supplied whether or not they are specifically shown on the Drawings or stated herein.
- E. Unless otherwise specifically stated elsewhere herein, the CONTRACTOR shall include in the bid proposal all materials, electrical supplies, fuel, lubricants, temporary equipment, temporary wiring, temporary piping and fittings, pumps, gages, and all other items of whatever nature required to completely test, balance, and put into fully operational condition all equipment and/or systems supplied by either the OWNER or the CONTRACTOR and installed as a part of this Project. Further, any test materials supplied by the CONTRACTOR shall be completely satisfactory to the OWNER. Any decision as to whether a particular material is suitable for test purposes shall be at the sole discretion of the Engineer whose decision shall be final. Any material considered not suitable shall be immediately replaced by the CONTRACTOR with suitable material and no extra compensation will be allowed.
- F. Extra casing that is not installed, up to the contract quantities, will be paid for per the bid form and the subsequent schedule of values. Additional laydown and staging areas will not be provided for purposes of storing casing during the Work. Leftover casing will be removed by the CONTRACTOR from the facility upon completion of the Work and will remain the property of the CONTRACTOR.

1.3 EXPLANATION AND DEFINITIONS

- A. The following explanation of the Measurement and Payment for the bid form items is made for information and guidance. The omission of reference to any item in this description shall not, however, alter the intent of the bid form or relieve the CONTRACTOR of the necessity of furnishing such as a part of the Contract.

1.4 MEASUREMENT

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

1.5 PAYMENT

- A. Payment shall be made for the items listed on the Bid Form on the basis of

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

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

1.6 SCHEDULE OF VALUES

- A. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Prepare preliminary schedule in accordance with the General Conditions. Submit preliminary schedule of values within 10 calendar days after the Effective Date of the Agreement. Submit final schedule of values in accordance with the General Conditions.
- B. Format: Utilize a format similar to the Table of Contents of the Project Specifications. Identify each line item with number and title of the major specification. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of CONTRACTOR's overhead profit.
- C. Revisions: With each Application for Payment, revise schedule to list approved Change Orders.

1.7 APPLICATION FOR PAYMENT

- A. Required Copies: Submit three copies of each application on EJCDC Form No. 1910-8-E (1990) or approved equal. Present required information in typewritten form or on electronic media printout.
- B. Execute certification by signature of authorized officer.
- C. Use data from approved Schedule of Values.
- D. Stored Materials: When payment for materials stored is permitted, submit a separate schedule for Materials Stored showing line item, description, previous value received, value incorporated into the Work and present value.
- E. Change Orders: List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of work.
- F. Final Payment: Prepare Application for Final Payment as required in the General Conditions.

- G. Submit an updated construction schedule for each Application for Payment.

PART 2 EXECUTION

2.1 MEASUREMENT AND PAYMENT

- A. Payment shall be made on the basis of work actually performed completing each item in the Bid, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the drawings and described in the specifications.

- B. Well Rehabilitation and MIT - Downhole construction**

It is intended that all work required to complete this Contract will be included in the various bid items as listed in the bid form and as further described below.

1. Item No. I-1. For initial mobilization and for performing preparatory work including setting up temporary facilities, preparing shop drawing submittals, conducting pre-construction video, coordination with the OWNER and ENGINEER, and the mobilization to the Project site of construction equipment, supplies, materials, personnel, safety equipment and first aid supplies, and other items required to initiate construction, such as temporary power, potable water and fencing. This item shall include the costs of bonds, required insurance, and other preconstruction expenses.
 1. No actual construction or physical preparatory work may be performed at the site until the work of this item has been successfully achieved unless specific written approval by the Engineer is granted for said work. Such permission by the Engineer will only be granted if all bond and insurance is in place and a complete Schedule of Values and Baseline Construction Schedule has been supplied by the Contractor and approved by the Engineer.
 2. The mobilization item will be paid for in the first two (2) payments, each equal to fifty (50) percent of the amount bid for this item, which will be made conditioned upon progress satisfactory to the Engineer being made pursuant to the accepted Project schedule.
 3. One mobilization will be paid.
 4. Since this item is bid as a lump sum, payment will be in accordance with the cost breakdown as approved by the Engineer.

2. Item No. I-2. For all costs incurred for suppressing the artesian wellhead

pressure in the well, if required. This item will be paid at the lump sum bid and as measured as required by and satisfactory to the Engineer.

3. Item No. I-3. For purchase, delivering to the OWNER and all labor and costs associated with the installation of the 11.75-inch ID carbon steel seamless casing. Payment will be in accordance with the unit price bid per linear foot as approved by the Engineer.
4. Item No. I-4. For all costs and labor incurred in performing geophysical logging associated with installation of the 11.75-inch ID carbon steel seamless casing (Pre-cement CBL Log). Since this item is bid as a lump sum, payment will be in accordance with the cost breakdown as approved by the Engineer.
5. Item No. I-5. For all costs of furnishing and installing the ASTM C150 Type II or ASTM C595M-21 Type 1L cement for the installation of the 11.75-inch ID carbon steel seamless casing. Payment will be in accordance with the unit price bid per cubic foot as approved by the Engineer.
6. Item No. I-6. For all costs and labor incurred in performing geophysical logging associated with installation of 11.75-inch ID carbon steel seamless casing (TEMP/GR in cementing stages and post-cement CBL logs). Since this item is bid as a lump sum, payment will be in accordance with the cost breakdown as approved by the Engineer.
7. Item No. I-7. For all costs and labor incurred in conducting internal and external MIT of the 11.75-inch ID carbon steel seamless casing. Since this item is bid as a lump sum, payment will be in accordance with the cost breakdown as approved by the Engineer.
8. Item No. I-8. For all costs of furnishing and installing a modified well head assembly for IW-1 consisting, but not limited to, carbon steel to stainless transition coupling and all necessary flanged connections and ports as shown in the engineering drawings. Since this item is bid as a lump sum, payment will be in accordance with the cost breakdown as approved by the Engineer.
9. Item No. I-9. For all costs incurred for demobilization and cleanup will be paid as a lump sum bid. The Contractor will be responsible for removing all equipment, excess materials, and debris from site. The amount bid shall include cleanup, the removal of all trash and debris, load, transport, and discard in a lawful manner, including all tipping fees, and post-construction video; the Contractor shall also restore the site to original or better including restoring any disturbed sodding, sidewalks, paving, and landscaping that is the responsibility of the Contractor as defined herein. Demobilization will be paid at the lump sum bid and as measured as required by and satisfactory to the Engineer.

2.2 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment : Will be made in accordance with the Contract.
- B. Final Payment: Will be made only for materials incorporated in Work; remaining materials, 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.

2.3 FINAL APPLICATION FOR PAYMENT

- A. Prior to submitting final application, make acceptable delivery of required documents and other requirements as specified in **Section 01700 - Contract Closeout and other Contract requirements**.
- B. Final payment shall be subject to the conditions and requirements included in the Contract.

2.4 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.

2.5 BID PRICES

- A. The price for each item shall be stated in figures in the appropriate places in the Bid/Proposal Form. All blank spaces for prices must be filled in with ink, or with a typewriter. The Contractor is further directed to submit on the latest version of the Bid/Proposal Form if modified by addendum. Non-compliance by the Contractor of this directive may be grounds for rejection of proposal.
- B. In the event that the number of units multiplied by the unit price shown in numbers equals the total price for that item, the numbers shall govern over the unit price shown in words.
- C. Where an error is made in the calculation of the total price of an item, the unit price shall govern.
- D. If the Contractor makes an error in addition of the total prices of the applicable items in the bid, the correct sum of its' applicable item totals shall be the Total Price.
- E. It has been determined that the OWNER is not exempt from the payment of Florida State Sales Tax under this Contract. All items of materials, equipment and supplies furnished

by the Contractor and remaining a part of the completed Project are subject to this Tax. The Contractor shall include a sufficient amount of money to pay for this Tax in Contractor price. Sufficient money to pay the Tax for all miscellaneous materials and minor items shown on the Drawings, specified herein, or necessary for the Work, and which will remain a part of the completed Project, shall also be included in the price or prices, and no other compensation will be provided.

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description of Requirements
- B. Submittal Procedures
- C. Specific Submittal Requirements
- D. Action on Submittals
- E. Repetitive Review

1.2 DESCRIPTION OF REQUIREMENTS

- A. This section specifies procedural requirements for Shop Drawings, product data, samples, and other miscellaneous Work-related submittals.
- B. Procedures concerning items such as listing of manufacturers, suppliers, subcontractors, construction progress schedule, schedule of Shop Drawing submissions, bonds, payment applications, insurance certificates, and schedule of values are specified elsewhere.
- C. Work-Related Submittals:
 - 1. Substitution or "Or Equal" Items:
 - a. Includes material or equipment CONTRACTOR requests ENGINEER to accept, after Bids are received, as substitute for items specified or described in Specifications by using name of a proprietary item or name of particular supplier.
 - 2. Shop Drawings:
 - a. Includes technical data and drawings specially prepared for this Project, including fabrication and installation drawings, diagrams, actual performance curves, data sheets, schedules, templates, patterns, reports, instructions, design mix formulas, measurements, and similar information not in standard printed form.

- b. Standard information prepared without specific reference to the Project is not considered a Shop Drawing.
- 3. Product Data:
 - a. Includes standard printed information on manufactured products, and systems that has not been specially prepared for this Project, including manufacturer's product specifications and installation instructions, catalog cuts, standard wiring diagrams, printed performance curves, mill reports, and standard color charts.
- 4. Samples:
 - a. Includes both fabricated and manufactured physical examples of materials, products, and units of work, partial cuts of manufactured or fabricated work, swatches showing color, texture, and pattern, and units of work to be used for independent inspection and testing.
 - b. Mock-ups are special forms of samples which are too large or otherwise inconvenient for handling in manner specified for transmittal of sample submittals.
- 5. Working Drawings:
 - a. When used in the Contract Documents, the term "working drawings" shall be considered to mean the CONTRACTOR'S plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities control systems, forming and falsework for underpinning; temporary by-pass pumping and for such other work as may be required for construction but does not become an integral part of the project.
 - b. Copies of working drawings shall be submitted to the ENGINEER at least fourteen (14) calendar days (unless otherwise specified by the ENGINEER) in advance of the required work.
 - c. Working drawings shall be signed by a registered Professional Engineer currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use.
- 6. Miscellaneous Submittals:
 - a. Work-related submittals that do not fit in the previous categories, such as guarantees, warranties, certifications, experience records, maintenance agreements, Operating and Maintenance Manuals, workmanship bonds,

survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, and similar information, devices, and materials applicable to the Work.

1.3 SUBMITTAL PROCEDURES

A. Scheduling:

1. Submit for approval, a preliminary schedule of shop drawings and samples submittals, in duplicate, and in accordance with the General Conditions.
2. Prepare and transmit each submittal to ENGINEER sufficiently in advance of scheduled performance of related work and other applicable activities.

B. Coordination:

1. Coordinate preparation and processing of submittals with performance of work. Coordinate each submittal with other submittals and related activities such as substitution requests, testing, purchasing, fabrication, delivery, and similar activities that require sequential activity.
2. Coordinate submission of different units of interrelated work so that one submittal will not be delayed by ENGINEER's need to review a related submittal. ENGINEER may withhold action on any submittal requiring coordination with other submittals until related submittals are forthcoming.

C. Submittal Preparation:

1. Stamp and sign each submittal certifying to review of submittal, verification of products, field measurement, field construction criteria, coordination of information within submittal with requirements of the Work and the Contract Documents, coordination with all trades, and verification that product will fit in space provided.
2. Transmittal Form: In the transmittal form forwarding each specific submittal to the ENGINEER include the following information as a minimum.
 - a. Date of submittal and dates of previous submittals containing the same material.
 - b. Project title and number.
 - c. Submittal and transmittal number.
 - d. Contract identification.

- e. Names of:
 - (1) Contractor
 - (2) Supplier
 - (3) Manufacturer
- f. Identification of equipment and material with equipment identification numbers, model numbers, and Specification section number.
- g. Variations from Contract Documents and any limitations which may impact the Work.
- h. Drawing sheet and detail number as appropriate.

D. Resubmittal Preparation:

- 1. Comply with the requirements described in Submittal Preparation. In addition:
 - a. Identify on transmittal form that submittal is a resubmission.
 - b. Make any corrections or changes in submittals required by ENGINEER's notations on returned submittal.
 - c. Respond to ENGINEER's notations:
 - (1) On the transmittal or on a separate page attached to CONTRACTOR's resubmission transmittal, answer or acknowledge in writing all notations or questions indicated by ENGINEER on ENGINEER's transmittal form returning review submission to CONTRACTOR.
 - (2) Identify each response by question or notation number established by ENGINEER.
 - (3) If CONTRACTOR does not respond to each notation or question, resubmission will be returned without action by ENGINEER until CONTRACTOR provides a written response to all ENGINEER's notations or questions.
 - d. CONTRACTOR initiated revisions or variations:
 - (1) On transmittal form identify variations or revisions from previously reviewed submittal, other than those called for by ENGINEER.
 - (2) ENGINEER's responsibility for variations or revisions is established in the General Conditions.

1.4 SPECIFIC SUBMITTAL REQUIREMENTS

- A. Specific submittals required for individual elements of work are specified in the individual Specification sections. Except as otherwise indicated in Specification sections, comply with requirements specified herein for each indicated type of submittal.
- B. Requests for Substitution or "Or Equal"
 - 1. Collect data for items to be submitted for review as substitution into one submittal for each item of material or equipment in accordance with the General Conditions.
 - 2. Submit with other scheduled submittals for the material or equipment allowing time for ENGINEER to evaluate the additional information required to be submitted.
 - 3. If CONTRACTOR requests to substitute for material or equipment specified but not identified in Specifications as requiring submittals, schedule substitution submittal request in Submittal schedule and submit as scheduled.
- C. Shop Drawings:
 - 1. Check all drawings, data and samples before submitting to the ENGINEER for review. Each and every copy of the drawings and data shall bear CONTRACTOR's stamp showing that they have been so checked. Shop drawings submitted to the ENGINEER without the CONTRACTOR's stamp will be returned to the CONTRACTOR for conformance with this requirement. All shop drawings shall be submitted through the CONTRACTOR, including those from any subcontractors.
 - 2. Submit newly prepared information, with graphic information at accurate scale. Indicate name of manufacturer or supplier (firm name). Show dimensions and clearly note which are based on field measurement; identify materials and products which are included in the Work; identify revisions. Indicate compliance with standards and notation of coordination requirements with other work. Highlight, encircle or otherwise indicate variations from Contract Documents or previous submittals.
 - 3. Include on each drawing or page:
 - a. Submittal date and revision dates.
 - b. Project name, division number and descriptions.
 - c. Detailed specifications section number and page number.

- d. Identification of equipment, product or material.
 - e. Name of CONTRACTOR and Subcontractor.
 - f. Name of Supplier and Manufacturer.
 - g. Relation to adjacent structure or material.
 - h. Field dimensions, clearly identified.
 - i. Standards or Industry Specification references.
 - j. Identification of deviations from the Contract Documents.
 - k. CONTRACTOR's stamp, initialed or signed, dated and certifying to review of submittal, certification of field measurements and compliance with Contract.
 - l. Physical location and location relative to other connected or attached material at which the equipment or materials are to be installed.
4. Provide 8-inch by 3-inch blank space for CONTRACTOR and ENGINEER stamps.
5. Submittals:
- a. Submit 3 hard copies plus 1 PDF.
6. Distribution:
- a. Do not proceed with installation of materials, products or systems until copy of applicable product data showing only approved information is in possession of installer.
 - b. Maintain one set of product data (for each submittal) at the Site.
 - c. Mark 5 additional copies with the date of approval and forward to the ENGINEER for use in field and for OWNER's records.
- D. Product Data:
1. Preparation:
- a. Collect required data into single submittal for each element of work or system. Where product data has been printed to include information on several similar products, some of which are not required for use on

Project or are not included in submittal, mark copies to clearly show such information is not applicable.

- b. Where product data must be specially prepared for required products, materials or systems, because standard printed data are not suitable for use, submit data as a Shop Drawing and not as product data.

2. Submittals:

- a. Submittal is for information and record, and to determine that products, materials, and systems comply with Contract Documents. Submittal is final when returned by ENGINEER marked "Approved" or "Approved as Noted".
- b. Submit 3 copies.

3. Distribution:

- a. Do not proceed with installation of materials, products or systems until copy of applicable product data showing only approval information is in possession of installer.
- b. Maintain one set of product data (for each submittal) at the Site, available for reference by ENGINEER and others.
- c. Mark 5 additional copies with the date of approval and forward to the ENGINEER for use in field and for OWNER records.

E. Samples:

1. Preparation:

- a. Where possible, provide samples that are physically identical with proposed materials or products to be incorporated into the Work. Where variations in color, pattern or texture are inherent in material or product represented by sample, submit multiple units (not less than 3 units) showing approximate limits of variations.
- b. Provide full set of optional samples where ENGINEER's selection required. Prepare samples to match ENGINEER's selection where so indicated.
- c. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards.

- d. Submit samples for ENGINEER's visual review of general generic kind, color, pattern, texture, and for final check of coordination of these characteristics with other related elements of work.
2. Submittals:
- a. At CONTRACTOR's option, and depending upon nature of anticipated response from ENGINEER, initial submittal of samples may be either preliminary or final submittal.
 - b. A preliminary submittal, consisting of a single set of samples, is required where specifications indicate ENGINEER's selection of color, pattern, texture or similar characteristics from manufacturer's range of standard choices is necessary. Preliminary submittals will be reviewed and returned with ENGINEER's "Action" marking.
 - c. Final Submittals: Submit 3 sets of samples in final submittal, 1 set will be returned.
3. Distribution:
- a. Maintain returned final set of samples at the Site, in suitable condition and available for quality control comparisons throughout course of performing work.
 - b. Returned samples intended or permitted to be incorporated in the Work are indicated in Specification sections, and shall be in undamaged condition at time of use.
- F. Mock-Ups:
- 1. Mock-ups and similar samples specified in Specification sections are recognized as special type of samples. Comply with samples submittal requirements to greatest extent possible. Process transmittal forms to provide record of activity.
- G. Miscellaneous Submittals:
- 1. Inspection and Test Reports:
 - a. Classify each inspection and test report as being either "Shop Drawings" or "product data", depending on whether report is specially prepared for Project or standard publication of workmanship control testing at point of production. Process inspection and test reports accordingly.
 - 2. Guarantees, Warranties, Maintenance Agreements, and Workmanship Bonds:

- a. Refer to Specification sections for specific requirements. Submittal is final when returned by ENGINEER marked "Approved" or "Approved as Noted".
 - b. In addition to copies desired for CONTRACTOR's use, furnish 2 executed copies. Provide 2 additional copies where required for maintenance data.
3. Survey Data:
- a. Refer to Specification sections for specific requirements on property surveys, building or structure condition surveys, field measurements, quantitative records of actual Work, damage surveys, photographs, and similar data required by Specification sections. Copies will not be returned.
 - (1) Survey Copies: Furnish 2 copies. Provide 10 copies of final property survey (if any).
 - (2) Condition Surveys: Furnish 2 copies.
4. Certifications:
- a. Refer to Specification sections for specific requirement on submittal of certifications. Submit 7 copies. Certifications are submitted for review of conformance with specified requirements and information. Submittal is final when returned by ENGINEER marked "Approved".
5. Closeout Submittals:
- a. Refer to Specification **Section 01 77 00 – Contract Closeout** for specific requirements on submittal of closeout information, materials, tools, and similar items.
 - (1) Record Documents: **Section 01 77 00 – Contract Closeout.**
 - (2) Materials and Tools: Spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar physical units to be submitted.
 - (3) Operating and maintenance data.
- H. General Distribution:
- 1. Unless required elsewhere, provide distribution of submittals to subcontractors, suppliers, governing authorities, and others as necessary for proper performance of work.

1.5 ACTION ON SUBMITTALS

A. ENGINEER's Action:

1. General:

- a. Except for submittals for record and similar purposes, where action and return on submittals are required or requested, ENGINEER will review each submittal, mark with appropriate action, and return. Where submittal must be held for coordination, ENGINEER will also advise CONTRACTOR without delay.
- b. ENGINEER will stamp each submittal with uniform, self-explanatory action stamp, appropriately marked with submittal action.

B. Action Stamp:

1. Approved:

- a. Final Unrestricted Release: Where submittals are marked "Approved", Work covered by submittal may proceed PROVIDED IT COMPLIES WITH CONTRACT DOCUMENTS. Acceptance of Work will depend upon that compliance.

2. Approved As Noted:

- a. When submittals are marked "Approved as Noted", Work covered by submittal may proceed PROVIDED IT COMPLIES WITH BOTH ENGINEER'S NOTATIONS OR CORRECTIONS ON SUBMITTAL AND WITH Contract Documents. Acceptance of Work will depend on that compliance. Re-submittal is not required.

3. Comments Attached - Confirm or Resubmit:

- a. When submittals are marked "Examined and Returned for Correction", do not proceed with Work covered by submittal. Do not permit Work covered by submittal to be used at the Site or elsewhere where Work is in progress.
- b. Revise submittal or prepare new submittal in accordance with ENGINEER's notations in accordance with Paragraph 1.3D of this section. Resubmit submittal without delay. Repeat if necessary to obtain different action marking.

1.6 RE-SUBMITTAL REVIEW

- A. Cost of Subsequent Reviews: Shop Drawings and Operation and Maintenance Manuals submitted for each item will be reviewed no more than twice at the OWNER's expense. All subsequent reviews will be performed at times convenient to the ENGINEER and at the CONTRACTOR's expense based on the ENGINEER's then prevailing rates including all direct and indirect costs and fees. Reimburse the OWNER for all such fees invoiced to the OWNER by the ENGINEER.
- B. Time Extension: Any need for more than one resubmission, or any other delay in ENGINEER's review of submittals, will not entitle CONTRACTOR to extension of the Contract Time.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01 57 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General Requirements
- B. Temporary Utilities
- C. Temporary Construction
- D. Barricades and Enclosures
- E. Fences
- F. Security
- G. Temporary Controls
- H. Traffic Regulation

1.2 GENERAL REQUIREMENTS

- A. Plant and Facilities: Furnish, install, maintain and remove all false work, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the Work and which are not herein described or specified in detail. The CONTRACTOR shall accept responsibility for the safety and efficiency of such works and for any damage that may result from their failure or from their improper construction, maintenance or operation.
- B. First Aid: Maintain a readily accessible, completely equipped first aid kit at each location where work is in progress.
- C. Safety Responsibility: Accept sole responsibility for safety and security at the site. Indemnify and hold harmless the OWNER and the OWNER's Authorized Representatives, including the ENGINEER, for any safety violation, or noncompliance with governing bodies and their regulations, and for accidents, deaths, injuries, or damage at the site during occupancy or partial occupancy of the site by CONTRACTOR's forces while performing any part of the Work.

- D. Hazard Communication: Furnish two copies of the CONTRACTOR's Hazard Communication Program required under OSHA regulations before beginning on site activities. Furnish two copies of amendments to Hazard Communications Program as they are prepared.

1.3 TEMPORARY UTILITIES - WATER

- A. Provide all necessary and required water without additional cost, unless otherwise specified. If necessary, provide and lay water lines to the place of use; secure all necessary permits; pay for all taps to water mains and hydrants and for all water used at the established rates.

1.4 TEMPORARY UTILITIES – SANITARY FACILITIES

- A. Provide sufficient sanitary facilities for construction personnel. Prohibit and prevent nuisances on the site of the Work or on adjoining property. Discharge any employee who violates this rule. Abide by all environmental regulations or laws applicable to the Work.

1.5 TEMPORARY UTILITIES – ELECTRICITY

- A. Provide an engine generator, muffled to the satisfaction of the ENGINEER, or obtain a power source for temporary electricity (from Florida Power and Light Company [FPL]). Furnish, install and maintain temporary electric power service for construction needs throughout construction site as necessary.
 - 1. Power centers for miscellaneous tools and equipment used in construction work are to be supplied as appropriate.
 - a. Locate so that power is available at any desired point with no more than 100 feet extension.
 - b. Provide weatherproof distribution box with minimum of four 20 amp 120-volt ground outlets.
 - c. Provide circuit breaker protection for each outlet.
 - d. Provide equipment grounding continuity for entire system.
 - e. Users shall provide grounded, Underwriters' Laboratories (UL) approved extension cords from power center to point of operations.
 - 2. Power for construction equipment.
 - 3. Power for testing and checking equipment.
 - 4. Power for welding units and for other equipment having special power requirements.
- B. Capacity:
 - 1. Adequate electrical service distribution for construction use by all trades during construction period.
 - 2. If using a temporary FPL service, notify FPL if unusually heavy loads, such as welding, pumps, and other special power requirements, will be connected.

- a. Provide special circuits for heavy load requirements.
 - b. Do not overload any circuit.
- C. Maintain strict supervision of use of temporary services.
 - 1. Enforce conformance with applicable standards.
 - 2. Enforce safe practices.
 - 3. Prevent abuse of services.
- D. Costs of Installation and Operation: The CONTRACTOR shall pay costs of temporary electrical power used, including costs of installation, meter, maintenance and removal of temporary services upon completion of construction.
- E. Code Compliance: Comply with the following applicable codes:
 - 1. National Electrical Code.
 - 2. National Electrical Safety Code.
 - 3. National Fire Protection Association.
 - 4. Federal, State and local codes and utility company regulations.

1.6 CONNECTIONS TO EXISTING UTILITIES:

- 1. Unless otherwise specified or indicated, make all necessary connections to existing facilities including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electricity. In each case, obtain permission from the OWNER or the owning utility prior to undertaking connections. Protect facilities against deleterious substances and damage.
- 2. Thoroughly plan in advance all connections to existing facilities. Have on hand at the time of undertaking the connections, all material, labor and required equipment. Proceed continuously to complete connections in minimum time. Arrange for the operation of valves or other appurtenances on existing utilities, under the direct supervision of the owning utility.

1.7 TEMPORARY CONSTRUCTION

- A. Bridges: Design and place suitable temporary bridges where necessary for the maintenance of vehicular and pedestrian traffic. Assume responsibility for the sufficiency and safety of all such temporary work or bridges and for any damage which may result from their failure or their improper construction, maintenance, or operation. Indemnify and save harmless the OWNER and the OWNER's representatives from all claims, suits or actions, and damages or costs of every description arising by reason of failure to comply with the above provisions.

1.8 BARRICADES AND ENCLOSURES

- A. Protection of Workmen and Public: Effect and maintain at all times during the

prosecution of the Work, barriers and lights necessary for the protection of Workmen and the Public. Provide suitable barricades, lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the Work causes obstructions to normal traffic, excavation sites, or constitutes in any way a hazard to the public.

B. Barricades and Lights:

1. Protect all streets, roads, highways, excavations and other public thoroughfares which are closed to traffic; use effective barricades which display acceptable warning signs. Locate barricades at the nearest public highway or street on each side of the blocked section.
2. Statutory Requirements: Install and maintain all barricades, signs, lights, and other protective devices within highway rights-of-way in strict conformity with applicable statutory requirements by the authority having jurisdiction.

1.9 FENCES

- A. Existing Fences: Obtain written permission from the OWNER prior to relocating or dismantling fences which interfere with construction operations. Reach agreements with the fence owner as to the period the fence may be left relocated or dismantled. Install adequate gates where fencing must be maintained. Keep gates closed and locked at all times when not in use.
- B. Restoration: Restore all fences to their original or better condition and to their original location on completion of the Work.

1.10 SECURITY

A. Preservation of Property:

1. Preserve from damage, all property along the line of the Work, in the vicinity of or in any way affected by the Work, the removal or destruction of which is not called for by the Drawings. Preserve from damage, public utilities, trees, lawn areas, building monuments, fences, pipe and underground structures, and public streets. Note: Normal wear and tear of streets resulting from legitimate use by the CONTRACTOR are not considered as damage. Whenever damages occur to such property, immediately restore to its original condition. Costs for such repairs are incidental to the Contract.
2. In case of failure on the part of the CONTRACTOR to restore property or make good on damage or injury, the OWNER may, upon 24 hours written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any moneys due or which may become due the CONTRACTOR under this Contract. If removal, repair or replacement of public or private property is made necessary by alteration of grade or alignment authorized by the OWNER and not contemplated by the Contract Documents, the CONTRACTOR will be

compensated, in accordance with the General Conditions, provided that such property has not been damaged through fault of the CONTRACTOR or the CONTRACTOR's employees.

B. Public Utility Installations and Structures:

1. Public utility installations and structures include all poles, tracks, pipes, wires, conduits, vaults, manholes, and other appurtenances and facilities, whether owned or controlled by public bodies or privately-owned individuals, firms or corporations, used to serve the public with transportation, gas, electricity, telephone, storm and sanitary sewers, water, or other public or private utility services. Facilities appurtenant to public or private property which may be affected by the Work are deemed included hereunder.
2. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. Existing public utility installations and structures are indicated on the Drawings only to the extent such information was made available to, or found by, the ENGINEER in preparing the Drawings. These data are not guaranteed for completeness or accuracy, and the CONTRACTOR is responsible for making necessary investigations to become fully informed as to the character, condition, and extent of all public utility installations and structures that may be encountered and that may affect the construction operations.
3. Contact utility locating service sufficiently in advance of the start of construction to avoid damage to the utilities and delays to the completion date.
4. Remove, replace, relocate, repair, rebuild, and secure any public utility installations and structures damaged as a direct or indirect result of the Work under this Contract. Costs for such work are incidental to the Contract. Be responsible and liable for any consequential damages done to or suffered by any public utility installations or structures. Assume and accept responsibility for any injury, damage, or loss which may result from or be consequent to interference with, or interruption or discontinuance of, any public utility service.
5. Repair or replace any water, electric, sewer, gas, irrigation, or other service connection damaged during the Work with no addition to the Contract price.
6. At all times in performance of the Work, employ proven methods and exercise reasonable care and skill to avoid unnecessary delay, injury, damage, or destruction to public utility installations and structures. Avoid unnecessary interference with, or interruption of, public utility services. Cooperate fully with the owners thereof to that end.
7. Give written notice to the owners of all public utility installations and structures affected by proposed construction operations, sufficiently in advance of breaking ground in any area or on any unit of the Work, to obtain their permission before disrupting the lines and to allow them to take measures

necessary to protect their interests. Advise the Chiefs of Police, Fire and Rescue Services of any excavation in public streets or the temporary shut-off of any water main. Provide at least 24 hours notice to all affected property owners whenever service connections are taken out of service.

- C. Miscellaneous Structures: Assume and accept responsibility for all injuries or damage to culverts, building foundations and walls, retaining walls, or other structures of any kind met with during the prosecution of the Work. Assume and accept liability for damages to public or private property resulting therefrom. Adequately protect against freezing all pipes carrying liquid.
- D. Protection of Trees and Lawn Areas:
 - 1. Protect with boxes, trees and shrubs, except those ordered to be removed. Do not place excavated material so as to cause injury to such trees or shrubs. Replace trees or shrubs destroyed by accident or negligence of the CONTRACTOR or CONTRACTOR's employees with new stock of similar size and age, at the proper season, at no additional cost to the OWNER.
 - 2. Leave lawn areas in as good condition as before the start of the Work. Restore areas where sod has been removed by seeding or sodding.

1.11 TEMPORARY CONTROLS

- A. During Construction:
 - 1. Keep the site of the Work and adjacent premises free from construction materials, debris, and rubbish. Remove this material from any portion of the site if such material, debris, or rubbish constitutes a nuisance or is objectionable.
 - 2. Remove from the site all surplus materials and temporary structures when they are no longer needed.
 - 3. Neatly stack construction materials such as concrete forms and scaffolding when not in use. Promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.
 - 4. Properly store volatile wastes in covered metal containers and remove from the site daily.
 - 5. Do not bury or burn on the site or dispose of into storm drains, sanitary sewers, streams, or waterways, any waste material. Remove all wastes from the site and dispose of in a manner complying with applicable ordinances and laws.
- B. Smoke Prevention:

1. Strictly observe all air pollution control regulations.
2. Open fires will be allowed only if permitted under current ordinances.

C. Noises:

1. Maintain acceptable noise levels in the vicinity of the Work. Limit noise production to acceptable levels by using special mufflers, barriers, enclosures, equipment positioning, and other approved methods.
2. Supply written notification to the OWNER sufficiently in advance of the start of any work which violates this provision. Proceed only when all applicable authorizations and variances have been obtained in writing.

D. Hours of Operation:

1. Once well rehabilitation efforts begin, the work may proceed continuously, (24 hours/day, 7 days/week) start to finish at the discretion of the Contractor staying within the limits of any applicable local ordinances (noise, dust, traffic, etc), until the Work is completed within the approved construction schedule in compliance with the contract duration requirements of the Contract.
2. Do not carry out nonemergency work, including equipment moves, on Sundays without prior written authorization by the OWNER. No work shall be performed on holidays or weekends unless otherwise specified or approved.

E. Dust Control:

1. Take measures to prevent unnecessary dust. Keep earth surfaces exposed to dusting moist with water or a chemical dust suppressant. Cover materials in piles or while in transit to prevent blowing or spreading dust.
2. Adequately protect buildings or operating facilities which may be affected adversely by dust. Protect machinery, motors, instrument panels, or similar equipment by suitable dust screens. Include proper ventilation with dust screens.

F. Temporary Drainage Provisions:

1. Provide for the drainage of stormwater and any water applied or discharged on the site in performance of the Work. Provide adequate drainage facilities to prevent damage to the Work, the site, and adjacent property.
2. Supplement existing drainage channels and conduits as necessary to carry all increased runoff from construction operations. Construct dikes as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect the OWNER's facilities and the Work, and to direct water to drainage channels or conduits. Provide ponding as necessary to prevent

downstream flooding.

3. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- G. Pollution: Prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. Do not permit sanitary wastes to enter any drain or watercourse other than sanitary sewers. Do not permit sediment, debris, or other substances to enter sanitary sewers. Take reasonable measures to prevent such materials from entering any drain or watercourse.

1.12 TRAFFIC REGULATION

- A. Parking: Provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Contract, to avoid any need for parking personal vehicles where they may interfere with public traffic, construction activities, or plant personnel/operations.
- B. Access: Conduct Work to interfere as little as possible with public travel, whether vehicular or pedestrian. Provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether public or private, give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when the CONTRACTOR has obtained permission from the owner or tenant of private property, or from the authority having jurisdiction over the public property involved, to obstruct traffic at the designated point.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

Section 01 65 00

PRODUCT DELIVERY REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE.

- A. This section covers packaging and shipping of materials and equipment.

1.02 PREPARATION FOR SHIPMENT.

- A. All equipment shall be suitably packaged to facilitate handling and to protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept dry at all times.
- B. Painted and coated surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted and coated surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer
- C. Grease and lubricating oil shall be applied to all bearings and similar items.

PART 2 PRODUCTS

NOT USED

PART 3 EXICUTION

3.01 SHIPPING.

- A. Before shipping each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

End of Section

Section 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE.

- A. This section covers delivery, storage, and handling of materials and equipment.

1.02 DELIVERY.

- A. Contractor shall bear the responsibility for delivery of equipment, spare parts, special tools, and materials to the site and shall comply with the requirements specified herein and shall provide required information concerning the shipment and delivery of the materials specified in this Contract. These requirements also apply to any subsuppliers making direct shipments to the Site.
- B. Contractor shall, either directly or through contractual arrangements with others, accept responsibility for the safe handling and protection of the equipment and materials furnished under this Contract before and after receipt at the port of entry. Acceptance of the equipment shall be made after it is installed, tested, placed in operation and found to comply with all the specified requirements.
- C. All items shall be checked against packing lists immediately on delivery to the site for damage and for shortages. Damage and shortages shall be remedied with the minimum of delay.
- D. Delivery of portions of the equipment in several individual shipments shall be subject to review of Engineer before shipment. When permitted, all such partial shipments shall be plainly marked to identify, to permit easy accumulation, and to facilitate eventual installation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 STORAGE.

- A. Upon delivery, all equipment and materials shall immediately be stored and protected until installed in the Work.
- B. Stacked items shall be suitably protected from damage by spacers or load distributing supports that are safely arranged. No metalwork (miscellaneous steel shapes and reinforcing steel) shall be stored directly on the ground. Masonry products shall be handled and stored in a manner to hold breakage, chipping, cracking, and spalling to a minimum. Cement, lime, and similar

products shall be stored off the ground on pallets and shall be covered and kept completely dry at all times. Pipe, fittings, and valves may be stored out of doors, but must be placed on wooden blocking. PVC pipe, geomembranes, plastic liner, and other plastic materials shall be stored off the ground on pallets and protected from direct sunlight.

- C. Pumps, motors, electrical equipment, and all equipment with antifriction or sleeve bearings shall be stored in weathertight structures maintained at a temperature above 60°F [16°C]. Electrical equipment, controls, and insulation shall be protected against moisture and water damage. All space heaters furnished in equipment shall be connected and operated continuously.
- D. Equipment having moving parts, such as gears, bearings, and seals, shall be stored fully lubricated with oil, grease, etc., unless otherwise instructed by the manufacturer. Manufacturer's storage instructions shall be carefully followed by Contractor.
- E. When required by the equipment manufacturer, moving parts shall be rotated a minimum of twice a month to ensure proper lubrication and to avoid metal to metal "welding". Upon installation of the equipment, Contractor shall, at the discretion of Engineer, start the equipment at one-half load for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
- F. When required by the equipment manufacturer, lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment by Contractor at the time of acceptance.
- G. Equipment and materials shall not show any pitting, rust, decay, or other deleterious effects of storage when installed in the Work.
- H. In addition to the protection specified for prolonged storage, the packaging of spare units and spare parts shall be for export packing and shall be suitable for long-term storage in a damp location. Each spare item shall be packed separately and shall be completely identified on the outside of the container.

3.02 HANDLING.

- A. Stored items shall be laid out to facilitate their retrieval for use in the Work. Care shall be taken when removing the equipment for use to ensure the precise piece of equipment is removed and that it is handled in a manner that does not damage the equipment.
- B. During handling, carbon steel constructed material including chains, straps, and forks on lifting equipment shall not directly contact any equipment or material constructed of stainless steel. It shall be the Contractor's responsibility to correct any carbon steel contamination of stainless steel.

End of Section

LEE COUNTY UTILITIES

INJECTION WELL IW-1 REHABILITATION AND MIT

PRODUCT STORAGE AND HANDLING
REQUIRMENTS

01 66 00-3

SECTION 01 77 00
CONTRACT CLOSE OUT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Warranties and Bonds
- B. Record Drawings
- C. Special Tools

1.2 WARRANTIES AND BONDS

Prior to final payment deliver to the OWNER the original and one copy of all bonds, warranties, guarantees and similar documents, including those customarily provided by manufacturers and suppliers which cover a period greater than the one year correction period. Show OWNER as beneficiary of these documents.

1.3 RECORD DRAWINGS

At the site keep and maintain one record copy of all Contract Documents, reference documents and all technical documents submitted in good order. As the work progresses the Engineer or designated representative shall record on one set of reproducible drawings all changes and deviations from the original Plans. The Engineer shall record the exact location of all changes in vertical and horizontal alignment by offsets and ties at each; sewer, water, electric, gas, communication and other services by off- set distance to permanent improvements such as building and curbs.

Prior to acceptance of the project and before final payment is made, the Engineer shall submit one (1) set of reproducible drawings, two (2) sets of blue-line or blackline prints, all marked "Drawings of Record". These Record Drawings must be certified by the Florida Registered Professional Engineer, who prepared the plans and signs and seals these plans, and submits AutoCAD compatible diskette copy of the drawings, and other applicable related records to the Department of Lee County Utilities.

The CONTRACTOR shall retain the services of a Florida Registered Land Surveyor to provide the OWNER with the As-Built Record Drawings necessary to record the existence of the injection well and temporary pad with the permanent warranty deed or other instrument of conveyance as a two page provision or addendum that contains certification of the location of the injection well (by meters and bounds) and a detailed sketch of the parcel that shows the location of the injection well. The location shall be measured by a Florida Registered Land Surveyor, and shall contain the surveyor's signature, registration number, official seal, and the following statement: "I hereby

certify that this survey was made under my responsible direction and supervision, and is a correct representation of the land surveyed.

On a case by case basis, Lee County Utilities may waive the requirement for certification by a Professional Land Surveyor, licensed in the State of Florida. However, prior consent must first be obtained from Lee County Utilities. The County shall withhold final acceptance of the project until the requirement for record drawings and related records has been met. Record Drawings without detailed field verified horizontal and vertical locations of all facilities shown will be rejected.

1.4 SPECIAL TOOLS

Special tools are considered to be those tools which, because of their limited use, are not normally available but which are necessary for maintenance of particular equipment.

For each type of equipment provided under this CONTRACT, furnish a complete set of all special tools including grease guns and other lubricating devices, which may be needed for the adjustment, operation, maintenance, and disassembly of such equipment. Furnish only tools of high grade, smooth forged alloy tool steel. Manufacture grease guns of the lever type.

Furnish and erect one or more neat and substantial steel wall cases or cabinets with flat key locks and clips or hooks to hold each special tool in a convenient arrangement.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 33 26 05
INJECTION WELL CASING

PART 1 GENERAL

1.01 RELATED WORK

- A. **Section 33 26 06 – Geophysical Logging, Section 33 26 07 – Grouting, Section 33 26 11 – MIT.**

1.02 SCOPE

- A. This section covers the work, materials, and equipment necessary for furnishing and installing steel well casing.

1.03 THE REQUIREMENT

- A. Commercial Standards: All work specified herein shall conform to or exceed the requirements of the applicable codes and standards relating to the referenced portions of the following documents only to the extent that the requirements therein are not in conflict with the provisions of this section. Where such documents have been adopted as a code or ordinance by the public agency having jurisdiction, such a code or ordinance shall take precedence.
- B. State Standards: SFWMD and FDEP rules and regulations for water wells in the Florida Administrative Code (FAC).
- C. Commercial Standards:
 - 1. ASTM A139 Specification for Electric-Fusion (Arc)-Welded Steel Pipe (Sizes 4-Inch Diameter and Over).
 - 2. ANSI/AWS D1.1 Structural Welding Code – Steel.
 - 3. AWS D10.9 Specification for qualification of welding procedures and welders for piping and tubing
 - 4. ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - 5. ASTM312/A312M Standard specification for seamless, welded, and heavily cold worked austenitic stainless steel pipes

- | | | |
|-----|---------------|---|
| 6. | ASTM409 | Standard specification for welded large diameter austenitic steel pipe for corrosive or high temperature service |
| 7. | API 5L | Specification for Line Pipe. |
| 8. | API 5CT | Specifications for casing and tubing |
| 9. | ASTMD1784 | Specification for Rigid PVC Compounds and Chlorinated PVC Compounds. |
| 10. | ASTM D2837 | Standard Test Method For Obtaining Hydrostatic Design Basis For Thermoplastic Pipe Materials. |
| 11. | ASTM D2996 | Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe. |
| 12. | ASTM D2310 | Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe. |
| 13. | ASTM F480 | Specification for Thermoplastic Well Casing Pipe and Couplings Made In Standard Dimension Ratios (SDR), SCH 40, and SCH 80. |
| 14. | AWWA A100 | Standard for Water Wells. |
| 15. | AWWA C200 | Steel water pipe, 6" and larger |
| 16. | AWWA C206 | Field Welding of Steel Water Pipe. |
| 17. | AWWA C207 | Steel pipe flanges for waterworks service, sizes 4" through 144" |
| 18. | API SPEC. 10D | Specification for Bow-Spring Casing Centralizers. |

1.04 CONTRACTOR SUBMITTALS

- A. **Welding:** Prior to the start of Work, the CONTRACTOR shall submit a list of the welders it proposes to use during well construction and the type of welding for which each has been qualified, along with current certification documents for each welder listed.
- a. All welders and welding operators shall be qualified at the CONTRACTOR's sole expense by a qualified testing

laboratory before performing any welding under this section. Qualification tests shall be in accordance with ANSI/AWS D10.9. Welders and operators shall be qualified for making groove welds in carbon steel and stainless steel pipe in positions 2G, 5G and 6G for each welding process to be used. Welders qualified for making groove welds in super duplex steel must be utilized for the final wellhead assembly.

- b. CONTRACTOR shall retest any welders at any time ENGINEER considers the quality of the welder's work substandard. When the ENGINEER requests the retest of a previously qualified welder, the labor costs for the retest will be at the CONTRACTOR's expense.
 - c. CONTRACTOR shall provide appropriate WPS for casing installation and temporary wellhead completion.
 - d. Welding Inspector Qualifications: A certified welding inspector (CWI) shall be required for the installation of components associate with the final casing as well as landing joints and injection wellhead. The CWI shall hold an active CWI certification in accordance with the AWS QCI, Standard for AWS Certification of Welding Inspectors. Alternate welding inspector qualifications require approval by the ENGINEER.
- B. **Mill Certificates:** Casing mill certificates showing manufacturing standards, dimensions, wall thickness, heat numbers, hydrostatic test pressure and results, and metallurgical test results shall be submitted to the ENGINEER for all casings no less than seven (7) days prior to the beginning of reaming operations. Heat numbers on casing joints shall be readily visible and legible or the casing will not be accepted by the ENGINEER. Any casing joint not having legible, traceable identification will be rejected.
- C. **Fittings:** Provide all fittings; drive shoe and centering guides as specified or as necessary to complete the well.
- D. **Operations:** The CONTRACTOR shall submit for the ENGINEER's approval plans for cementing operation and casing installation at least 72 hours prior to commencing work on those operations. These plans shall include the following information:
- 1. Tabulation of casing on Site
 - 2. Length of each section,
 - 3. Weight of each joint,
 - 4. Cumulative string weight,

5. Order of installation of casing sections
6. Locations of centralizers and casing tabs.
7. Estimated number of cement stages, cement type to be used and amount of cement to be pumped.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide all materials and equipment necessary for joining and installing casing as specified.
- B. Carbon steel seamless casing shall be as follows:

	Casing Diameter (nominal inches)		Casing Wall Thickness (inches)	Casing Depth (+/- Feet bls)
	Inside	Outside		
11.75-inch ID carbon steel seamless casing	11.75	12.75	0.5	2,370

2.02 STEEL CASING:

- A. Final casing on the injection well shall meet the requirements of ASTM A53 Grade B, seamless. The final segment below grade and above grade of the injection well final casing shall be new, unused 316L stainless steel conforming to the requirements of ASTM A312/A312M, Type 316L. The ends of each joint shall be machine beveled to ensure straightness of each assembled section. Casing joints shall be welded in accordance with ANSI/AWS D1.1. All casing material shall be new. No used or rusted casing will be accepted.

2.03 FITTINGS

- A. Centralizers shall be welded to steel casing and made of the same material as the casing. Casing centralizers shall meet the requirements of API Specification 10D. All centralizer groups shall be vertically aligned one above the other in order to permit the passage of tremie pipes alongside the casing to the bottom of the borehole. Casing centralizers shall be fitted on all casings as stipulated under the Execution section.
- B. Standard Cement Bond Log (CBL) Tool:
 1. Cement bond logging in casings with 24-inches or less diameter, typically is performed using a tool that has a single transmitter and two receivers spaced at 3-feet (the “3-foot receiver”) and the 5 feet (the “5-foot receiver”). In these Specifications, a cement bond log

utilizing this arrangement is referred to as a "Standard CBL" or "CBL using a standard tool".

2. If the type of tool to be used is not specified, the CONTRACTOR shall assume that the "Standard CBL Tool" shall be used.

PART 3 EXECUTION

3.01 GENERAL

- A. The Work shall be performed by a competent crew with equipment that is adequate to complete all phases of well construction.
- B. All casing shall be installed by a method appropriate to Drawings as selected by the CONTRACTOR.
- C. Casing lengths shall be joined watertight so that the resulting joint shall have the same structural integrity as the casing itself.
- D. Installation of casing in boreholes:
 1. The depths and lengths for casings shall be as indicated unless otherwise determined by the ENGINEER. Payment will be based on actual quantities furnished, installed, or constructed, in accordance with the schedule of values.
 2. All work required to be repeated, resulting from the CONTRACTOR's performance, or lack thereof, including all additional materials, labor and equipment required, shall be furnished at the expense of the CONTRACTOR and no claim for additional compensation shall be made or be allowed therefore, except as specifically provided herein.

3.02 CASING

- A. Casing Installation: The length and interval of the carbon steel seamless casing will be determined by the ENGINEER.
- B. Tension: The casing shall be suspended in tension from the surface. The casing shall be lowered into the well and the weight of the casing shall be supported by the drilling rig. The CONTRACTOR shall certify that the present hook load/weight capacity of the derrick and draw works meets the original manufacture's specifications or at a minimum 1.5 times the heaviest load anticipated to complete the work. The CONTRACTOR shall submit test results that are certified by a State of Florida licensed Professional Engineer regarding the hook load capacity of the drilling rig before mobilization.

- C. Collapsed Casing: If the casing should collapse for any reason prior to well completion, it shall be withdrawn and replaced at the CONTRACTOR's expense.
- D. Centralizers:
 - 1. Fabricated centralizers for steel casing shall be constructed of a minimum of 12 inches long, 2 inches wide, a minimum of 0.5-inch thick with a radius of 12 inches and welded with the concave surface against the casing to provide a minimum of 4 inches of clearance around the casing.
 - 2. Spaced at 90 degrees for casing larger than 12-inches in diameter.
 - 3. Vertical separation of centralizers during casing installation are as follows:
 - a. One at 5 feet above the bottom end
 - b. One at 20 feet above the bottom end
 - c. One at 40 feet above the bottom end
 - d. One at every joint thereafter.

3.03 WELDING

- A. The standards of the American Welding Society, Structural Welding Code (AWS D1.1) shall apply for all welded joint casing and accessories.
- B. All welded transition joints shall be made by welders certified in the State of Florida.
- C. The certified welder shall perform and be responsible for the integrity of all steel casing welds. The CONTRACTOR must provide the ENGINEER proof of welders' certifications 72 hours before any welding is performed. The reamer assembly shall remain in the borehole to complete reaming or condition the borehole until proof of welders' certification is provided to the ENGINEER.
- D. Any surface defects that shall affect the weld shall be chipped or ground out. A power-driven wire brush shall be used to thoroughly clean each layer of weld prior to each additional weld metal, including the final pass.
- E. There shall be a minimum of three (3) weld passes on pipe sizes 6-inches and greater. Welded joints shall be allowed to cool to less than 430 degrees Fahrenheit before the weld is placed in contact with water. This requirement can be met by maintaining the water level in the well deep enough so the hot weld joint can be lower for the next casing joint and not reach the water. CONTRACTOR shall use temperature melt sticks or infrared thermometer to verify weld temperature to meet the conditions of this requirement.

- F. Welding of the casing and pipes shall be done in accordance with the specifications. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. The welding rod or wire shall match the material being welded and shall be approved by the ENGINEER.
- G. Field Joints: All field joints shall be welded during installation by qualified welders in accordance with the requirements of ANSI/ASW D1.1 and/or AWWA C206.

3.04 ALIGNMENT AND SPACING

- A. The CONTRACTOR shall align pipe ends to be joined within commercial tolerance limits on diameters, wall thickness, and out-of-roundness. Record the amount of offset and degrees of circumference not matching within 0.10 –inches or less between the two joints. Provide record to the ENGINEER.
- B. The CONTRACTOR shall demonstrate that the installed casing is free hanging and can be rotated and reciprocated prior to grouting operations.
- C. The shielded metal-arc process shall be used for all carbon steel field welding.
- D. No welding shall be performed if there is impingement of any rain or high wind on the weld area, or if the ambient temperature is below 32°F. If the ambient temperature is less than 32°F, local preheating to a temperature that is warm to the hand is required.
- E. Tack welds, if not made by a qualified welder using the same procedure as for the completed weld, must be completely removed. Tack welds which are not removed shall be made with an electrode that is the same as, or equivalent to, the electrode to be used for the first weld pass. Tack welds that have cracked shall be removed.
- F. Each layer of deposited weld metal shall be thoroughly cleaned prior to the deposition of each additional layer of weld metal, including the final pass, with a power-driven wire brush. Surface defects which will affect the soundness of the weld shall be chipped out or ground out.

3.05 STANDARD CBL

- A. The CONTRACTOR will conduct a Standard CBL pre- and post-cementing (after waiting a minimum of 24 hours after setting and cementing) for the injection well 11.75-inch ID carbon steel seamless casing. The CONTRACTOR shall provide data to identify there is a cement envelope around the casing in a manner satisfactory to the ENGINEER.

END OF SECTION

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SECTION 33 26 06

GEOPHYSICAL LOGGING

PART 1 GENERAL

1.01 RELATED WORK

- A. **Section 33 26 05 – Well Casing, Section 33 26 07 – Grouting, Section 33 26 11 – MIT**

1.02 THE REQUIREMENT

- A. This section covers the work, materials, and equipment necessary to conduct geophysical logging and video surveys of the borehole and well during rehabilitation and testing.
- B. Applicable regulations from the United States Nuclear Regulatory Commission (U.S. NRC) (i.e. 10 CFR PART 39—LICENSES AND RADIATION SAFETY REQUIREMENTS FOR WELL LOGGING) shall apply for all specialty logging tools that require a neutron emitter.

1.03 CONTRACTOR SUBMITTALS

- A. **General:** All CONTRACTOR submittals shall conform to the applicable requirements of **Section 01 33 00 - Submittals** and the supplementary requirements specified. Each item listed below shall be submitted to the ENGINEER with a clear explanation or depiction of why or how the requirements, as listed, will be fulfilled by the products or services provided by the CONTRACTOR. This list is not considered all-inclusive and may be extended by the OWNER, ENGINEER, or CONTRACTOR.
- B. Geophysical Logging Firm: All geophysical logs shall be performed by a company licensed and experienced in the performance of such logs. The geophysical logging firm and the personnel must be pre-approved by the ENGINEER. The geophysical logging personnel shall be able to interpret the geophysical logs and/or have access to an experienced geophysical logger within the geophysical logging firm who can interpret the geophysical logs. The resume of the experienced geophysical loggers shall be provided to the ENGINEER for approval prior to any geophysical logging. The geophysical logging personnel may not leave the jobsite until the ENGINEER approves all the geophysical logs conducted.
- C. Geophysical Logging: The CONTRACTOR shall submit 3 printed field copies of all geophysical logs and also provide electronic copies in Log ASCII Standard (LAS) and Portable Document File (*.pdf) format immediately following the completion of logging operations via e-mail; final logs shall also be provided in Portable Document File (*.pdf) format on USB Flash Drive. Larger files, such as Borehole Televiewer videos, may be provided solely in a USB Flash Drive. Unless otherwise directed by the ENGINEER, for each geophysical logging suite performed, the

CONTRACTOR shall obtain from the Logging Firm, a summary report describing the logs performed and an interpretation of the results of the log or logs which will include flow interpretation and total dissolved solids plots. These logging reports shall be submitted to the ENGINEER within 72 hours of completion of logging.

- D. The CONTRACTOR shall prepare a written report which provides a qualitative evaluation of annular cement placement for the 11.75-inch inside diameter (ID) carbon steel seamless casing by comparing the results of the CBL performed on un-cemented and cemented casings. The report shall be submitted to the ENGINEER within 72 hours following completion of the standard CBL.
- E. Geophysical logging tool schematic drawing for each down-hole tool used.
- F. A schematic drawing of the standard cement bond logging tool and the procedure to perform the standard cement bond log shall be submitted. The tool configuration and procedure for running shall be approved the ENGINEER, subject to acceptance and approval for use by the Florida Department of Environmental Protection (FDEP).
- G. Geophysical Logging Firm, as applicable, shall be identified in the CONTRACTOR'S list of specialty subcontractors as stated in the proposal instructions.
- H. The ENGINEER may alter the geophysical logging schedule by adding or removing geophysical logs.

PART 2 PRODUCTS & EQUIPMENT

2.01 GENERAL

- A. CONTRACTOR shall provide a sheave and appurtenances from which Geophysical Logging Firm may hang logging equipment that will be lowered into the borehole or well; the equipment shall be designed for use in wireline logging and shall have a capacity to support the weight and loads resulting from the operation.
- B. CONTRACTOR shall furnish and install temporary pumping equipment and discharge valves and piping for all dynamic (pumping or flowing) geophysical logging operations.
- C. CONTRACTOR shall furnish and install all temporary flow control equipment required to contain and convey groundwater produced during geophysical logging operations either by pumping or from artesian flow.
- D. CONTRACTOR is advised that the well is expected to be under flowing artesian conditions during operations within the Floridan aquifer and static geophysical logging will require installation of a standpipe with wireline pack-off collar/lubricator.

2.02 GEOPHYSICAL LOGGING TOOLS

- A. CONTRACTOR will provide continuous digital geophysical logging equipment capable of performing and recording digital data from the following applicable standard geophysical logs:
1. X-Y Caliper (CAL): A four-arm (XY) caliper tool shall be used for logging. Response shall be recorded in inches in diameter and the caliper log report shall indicate borehole volume. Caliper logs shall be run under static conditions.
 2. Natural Gamma Ray (GR): Response shall be recorded in American Petroleum Institute (API) units. Gamma logs shall be run under static conditions.
 3. Dual-Induction (DIL), Laterolog, and Spontaneous Potential (SP): These geophysical logs, otherwise described as electric logs, shall be run under static (no flow) conditions.
 4. Borehole Compensated Sonic Log with Variable Density Display (BHC/VDL): The tool shall be capable of recording formation travel time and full waveform VDL. The tool must be capable of accurately recording the compressional wave transit time in a 30-inch borehole.
 5. Standard and Modified Cement Bond Log (CBL):
 - a. Cement bond logging in casings with 24-inch or less diameter, shall be performed using a tool that has a single transmitter and two receivers spaced at 3-feet (the "3-foot receiver") and the 5 feet (the "5-foot receiver"); this logging tool configuration is referred to in these specifications as a "Standard CBL" or "CBL using a standard tool".
 - b. A "Modified CBL" or "CBL using a modified tool" refers to a logging tool that has been modified for use in casings with diameters greater than 24-inch. The modified logging tool has a single transmitter with two receivers spaced 5 feet (the "5-foot receiver") and 7 feet (the (7-foot receiver") from the transmitter.
 - c. The CBL shall be run under static (no flow) conditions.
 6. Fluid Resistivity: Fluid resistivity logs shall be run under both static (no flow) and dynamic (flowing/pumped) conditions.
 7. Flowmeter (FM): Flowmeter log shall be run under both static (no flow) and dynamic (flowing/pumped) conditions. A flow interpretation log will be required within 24 hours of the logging activities.
 8. Temperature: Temperature logs shall be run under both static (no flow) and dynamic (flowing) conditions.

9. Color Video Survey with Side-Looking Rotating Camera: The video shall be run under dynamic (pumped) conditions to ensure video clarity.
10. Borehole Televiwer: In the event that an acceptable video survey cannot be run, a borehole televiwer log shall be substituted.
11. Casing Collar Locator (CCL): Shall be run in conjunction with other logs to assure depth control and prior to conducting radioactive tracer survey.
12. Radioactive Tracer Survey (RTS): Refer to **Section 33 26 11 – Mechanical Integrity Testing** for geophysical tool configuration and logging procedures.
13. Optical Borehole-Imager (OBI): Logs shall be run under static conditions. This log will not be conducted while drilling by the rotary method using mud circulation through the unconsolidated and soft formations to a depth of approximately 400 feet bls
14. Acoustic Borehole-Imager (ABI): Logs shall be run under static conditions.

B. Wireline Packoff/Lubricator Assembly:

1. The CONTRACTOR shall furnish and install a wireline pressure control device for use during geophysical logging operations conducted at depths within and below the base of the Floridan aquifer system and at times when it is necessary to conduct logging operations in pressurized well casing.
2. The wireline pressure control device shall be capable of being installed on both well casing and the pressure control stack appropriately sized and pressure rated crossovers and/or swedges shall be furnished.
3. The wireline pressure control device shall be provided with a flanged pump-in sub to allow introduction of fluids into the well and for casing pressurization. Ancillary equipment including bleed and isolation valves of equal pressure rating shall be furnished and installed for logging operations.

PART 3 EXECUTION

3.01 GENERAL

- A. For open-hole logging, the depth intervals shall correspond to the total length of the open-hole unless otherwise directed by ENGINEER.

- B. To be acceptable to the ENGINEER, each geophysical log must be run in a continuous manner between the top and bottom of the depth interval specified or selected by the ENGINEER
- C. CONTRACTOR shall provide ENGINEER with a 24-hour notice prior to logging to facilitate coordination of the logging activities with OWNER and 72-hour notice prior to logging activities with regulatory agencies; regulatory agencies may require attendance at geophysical logging events, as specified or identified in the Underground Injection Control (UIC) well construction permit.
- D. Each log shall be recorded using a depth measurement that is accurate to within the depth measured by the drill pipe. Each log will be submitted to the ENGINEER with an appropriate scale of:
 - 1. 1-inch = 100 feet
 - 2. 2-inch = 100 feet
 - 3. 5-inch = 100 feet
- E. All logs shall be clearly labeled with all pertinent information regarding the well construction progress, location, borehole and casing depths, logging scales, dates, etc. Each log shall include a repeat section of not less than 200 feet to verify logging tool performance; the repeat section shall be performed in a depth interval where an on-scale and identifiable logging signature is present.
- F. Each logging tool shall be calibrated in the presence of the ENGINEER.
- G. CONTRACTOR shall provide access to the well for the purpose of water level measurements or otherwise as requested by the ENGINEER during geophysical logging events.
- H. In the event that a geophysical tool becomes stuck in the well during logging operations, the CONTRACTOR shall develop a plan for retrieval. Where a nuclear source is involved in the retrieval operation, the CONTRACTOR shall provide notification and conduct retrieval or abandonment operations, as required, in accordance with 10 CFR PART 39 and any applicable Federal, State and/or Local laws. The CONTRACTOR, at his sole expense, shall be responsible for all costs associated with retrieval (fishing) operations, notification, reporting, and plugging/abandonment, repair or replacement of logging tools and equipment, as required by the Contract Documents and governing regulations. The CONTRACTOR will not be paid standby time during this period.
- I. The ENGINEER or designated representative shall have the authority to specify up-hole/down-hole logging speeds of the individual geophysical logs.

- J. No standby or additional rig time shall be paid to the CONTRACTOR during geophysical logging operations.
- K. Standby time shall not be paid to the CONTRACTOR for any time spent reconditioning or re-logging the borehole in the event that geophysical logs are not accomplished as specified.
- L. Wireline packoff/lubricator assembly shall be furnished, installed, operated, and tested by the CONTRACTOR. Equipment inspection and testing shall be conducted as required by the manufacturer and regulatory agencies having jurisdiction over the well drilling and construction operations.

3.02 GEOPHYSICAL LOGGING OPEN BOREHOLE

- A. A digitally recorded color video survey of the well shall be made from land surface to the total depth of the well in the down-hole and up-hole directions. ENGINEER shall identify any or all welds to be inspected using a sideward-looking camera with full 360° rotation capability; other features of interest, as directed by the ENGINEER, may also be inspected. The quality of the picture shall be acceptable to the ENGINEER for the entire depth of the survey. The survey shall be logged at a speed as approved by the ENGINEER and provided immediately after completion of the log in a USB Flash Drive.

3.03 GEOPHYSICAL LOGGING DURING CEMENTING PROCEDURES

- A. After each stage or lift of cement grout placed, as specified in **Section 33 26 07 – Grouting**, the CONTRACTOR shall conduct a combination temperature and gamma ray log to confirm the depth to the top of cement established by a hard tag made with tremie pipe.
- B. All temperature logs used to evaluate the top of cement shall be run within 8 to 10 hours following the completion of each cementing stage.
- C. Standard Cement Bond Log (CBL):
 - 1. Following the installation and assembly of the 11.75-inch ID carbon steel seamless casing in the injection well and before installation of cement grout, the CONTRACTOR shall perform a standard CBL as specified in the Sequence of Construction.
 - 2. Upon completion of the cementing operations on the 11.75-inch ID carbon steel seamless casing and following a curing period of not less than 48-hours, the CONTRACTOR shall perform a second standard CBL of the final casing. The casing shall be logged while pressurized to 250 psi; installation of a wireline packoff/lubricator assembly is required.

3. The CONTRACTOR shall provide a written report evaluating the pre- and post-cementing standard CBL's in accordance with paragraph 1.02D.

D. Standard CBL:

1. Upon completion of the installation of the 11.75-inch ID carbon steel seamless casing in the injection well, and cementing operations to within 300 feet of land surface, the CONTRACTOR shall perform a Standard CBL. The CONTRACTOR shall prepare and submit to the ENGINEER a report which quantitatively evaluates the data and explains the presence of annular cement surrounding the exterior of the 11.75-inch ID carbon steel seamless casing. The report shall be prepared and submitted in accordance with paragraph 1.02D.

3.04 GEOPHYSICAL LOGGING SCHEDULE

A. Injection Well Geophysical Log Schedule

Injection Well(s) Geophysical Log Schedule	
Drilling Interval	Geophysical Logs
Installation of the 11.75-inch ID carbon steel seamless casing to ±2,370 feet bls	Standard Cement Bond Log (prior to cementing activities); Cement Top Temperature and Natural Gamma Ray Logs after each cementing stage; Standard Cement Bond Log (post cementing activities) on pressurized casing (250 psi)
MIT Internal Inspection of the 11.75-inch ID carbon steel seamless casing and open hole (Fluid: potable freshwater)	Color Video Survey
External MIT	High Resolution Temperature Log Radioactive Tracer Survey

END OF SECTION

SECTION 33 26 07

GROUTING

PART 1 GENERAL

1.01 RELATED WORK

- A. **Section 33 26 04 – Well Drilling, Section 33 26 05 - Well Casing, Section 33 26 06 – Geophysical Logging, Section 33 26 11 – MIT.**

1.02 This Section covers the Work, materials, and equipment necessary for furnishing the cement grout seal, complete.

1.03 THE REQUIREMENT

- A. Commercial Standards: All Work specified herein shall conform to or exceed the requirements of the applicable codes and standards relating to the referenced portions of the following documents only to the extent that the requirements therein are not in conflict with the provisions of this section. Where such documents have been adopted as a code or ordinance by the public agency having jurisdiction, such a code or ordinance shall take precedence.
- B. State Standards: South Florida Water Management District (SFWMD) and Florida Department of Environmental Protection (FDEP) Rules and Regulations for Water Wells and Injection Wells in the Florida Administrative Code (FAC).
- C. Commercial Standards:
- | | |
|--|------------------------------------|
| ASTM C-150 | Specification for Portland Cement. |
| ASTM C595M-21 | Specification for Type 1L Cement |
| AWWA A100 | Standard for Water Wells. |
| NSF International (NSF): Standard 60: Drinking Water Treatment Chemicals—Health Effects. | |
- D. The cost of cement, additives, and pumping equipment shall be paid at the unit price per cubic foot of cement as stated in the proposal. This unit price shall include all necessary equipment, materials, and subcontracted services required to properly cement the casing and/or tubing as specified in this section.

1.04 CONTRACTOR SUBMITTALS

- A. **Cementing Specialist:** In all cementing operations, the CONTRACTOR must provide and be assisted by a cementing specialist familiar with cementing the type of formations typically encountered at the location of the well(s) and drilled depths as specified in these Contract Documents and Technical Specifications. The CONTRACTOR shall utilize the services of a company such as Halliburton Services, Baker Hughes, or equivalent, unless

the CONTRACTOR can demonstrate the expertise and previous experience of the individuals performing such cementing operations on at least three (3) equal or larger injection well casing cementing projects in the past 5 years.

- B. Data sheets on grout composition for each grout source used for cementing. Additives must be approved by the ENGINEER prior to delivery to the site.
- C. A grouting plan must be submitted to the ENGINEER for approval a minimum of 48 hours before the initial pressure grout and with adequate time for review and approval. Subsequent cement stage plans must be submitted and approved before additional cement is pumped.

PART 2 PRODUCTS

2.01 GENERAL

- A. THE CONTRACTOR shall provide all materials and equipment necessary for placing cement grout in the annular space outside the casing or tubing.

2.02 PORTLAND TYPE I/II OR TYPE 1L NEAT CEMENT

- A. Material used for sealing the casing shall consist of a cement grout using ASTM C-150 Type II Portland cement. Neat cement grout shall contain no more than 5.6 gallons of water per 94-pound sack of cement.
- B. In response to the discontinuation of the Type I/II cement, FDEP considers and approves PLC/Type IL cement with a limestone content between 5% and 15% as acceptable for use in well construction permitting. The PLC Type IL must still meet the respective standards listed in ASTM C595M-21.
 - 1. The Department considers and approves PLC/Type IL cement with a limestone content between 5% and 15% and with a specification of moderate sulfate (MS) resistance or better as acceptable when cementing Class I and Class III UIC wells as described in subsection 62-528.410(5) F.A.C. The exact designation shall be PLC Type IL (5-15%) (MS) or better in accordance with ASTM C595M-21.
 - 2. The Department considers and approves PLC/Type IL (5-15) (MS), used in conjunction with a FDEP approved pozzolanic secondary cementitious material (SCM), as acceptable as part of the well construction permitting. Pozzolanic SCM, such as calcined clay, silica fume or other environmentally friendly (non-coal ash) material are also effective for resistance to sulfate, chloride, and other forms of attack on cement and concrete.

2.03 BENTONITE AND OTHER ADDITIVES

- A. Additives may be mixed with the cement to control setting time, adjust yield, improve pumpability, or to adjust the slurry volume or weight.
 - 1. Not more than 6 percent bentonite by weight for casing installations and not more than 12 percent bentonite by weight for pilot hole back plugging operations.
 - 2. All additives shall be NSF approved except for naturally occurring minerals and shall be approved by the ENGINEER.
- B. Provide all high-yield, fine-grained, sodium bentonite (manufactured by Baroid Industrial Drilling Products, MISwaco, or equivalent) as required for cementing in the proportions specified and directed by the ENGINEER.
- C. Provide other cementing additives specifically formulated for use in water well cementing as required by the ENGINEER. Material Data Safety Sheet shall be provided to the ENGINEER for any proposed cement additives before the start of construction.
- D. The cost of all cement additives, including bentonite, shall be included in the cement grout unit cost.

2.04 MIXING WATER

- A. The OWNER will provide a place of temporary connection for a water supply for cementing. Temporary facilities and piping required to bring water to the point of use, and metering for such water, will be the CONTRACTOR's responsibility, as specified in Section 01 57 00 Construction Facilities and Temporary Controls.
- B. The CONTRACTOR shall be responsible to provide a reliable source of water for cementing, including storage and pumping equipment, to ensure cementing operations are accomplished as specified.

2.05 MONITORING EQUIPMENT

- C. Provide a calibrated in-line magnetic fluid densometer (or equal) and digital flowmeter, including a certified calibration report of each performed in the last 60 days. This equipment shall be able to continuously monitor the volume and density of cement grout blended and pumped during casing cementing operations.
- D. The slurry density determination shall be conducted in accordance with the latest edition of API Spec 10.
- E. Provide a pressurized mud scale for manual measurement of cement density.

PART 3 EXECUTION

3.01 GENERAL

- A. The Work shall be performed by a competent well cementing crew, as described in Sub-Section 1.03A of this Section, with equipment that is maintained and of adequate capacity to complete all phases of well cementing operations.
- B. Cement: Samples of cement shall be collected during the cement grout blending and pumping operations for all casings installed, with the CONTRACTOR collecting both dry and mixed (ready to pump) samples of the cement grout being used. Mixed cement samples shall include at least three (3) 2-inch cubes suitable for compressive strength tests, by the OWNER.
 - 1. Cement grout samples shall be collected a minimum of three (3) times during each cementing operation: Prior to pumping, at the middle, and at the end of the cementing operation. The specified slurry density shall match the specified slurry density indicated on the delivery certificate or subcontract cementing service company's job proposal.
 - 2. Only 2-inch cubes, suitable for tests of compressive strength, will be acceptable as representative cement samples.
- C. Operations: The CONTRACTOR shall submit for the ENGINEER's approval plans for cementing operation and casing installation at least 72 hours prior to commencing Work on those operations. These plans shall include the following information:
 - 1. Cementing Program: Top and bottom of each interval to be cemented, pre-flush and spacer, composition of cement to be used in each interval and volume to be pumped, method of emplacement of cement, expected fill-up, expected pressures, and any additives to be used. The cementing program shall be prepared in a spreadsheet format and no cementing work may proceed until ENGINEER and FDEP (if required by permit) approve the cementing program.
- D. All Work required to be repeated, resulting from the CONTRACTOR's unsatisfactory performance, including all additional materials, labor, and equipment required, shall be furnished at the expense of the CONTRACTOR and no claim for additional compensation shall be made or be allowed therefore, except as specifically provided herein.
- E. The CONTRACTOR, or his SUBCONTRACTOR, shall be responsible for calculating cement volumes prior to and following grouting operations. The ENGINEER shall review methods and volumes prior to commencing cement grout pumping.

3.02 CEMENTING OF CASING

- A. Cementing of casing shall be accomplished to completely fill the annular space from the bottom of the casing or the top of the preceding cement stage, to the level shown on the Drawings, or as directed by the ENGINEER.

- B. It is the CONTRACTOR's responsibility to conduct the cementing operations in such a manner that both the rated burst and collapse strengths of the casing and/or tubing are not exceeded; deformation of the casing is prohibited. Placement of grout shall be at an annular rate determined by the CONTRACTOR and approved by the ENGINEER, prior to the commencement of cementing operations. All piping and valving shall be capable of handling the required pumping rates and pressures. The CONTRACTOR shall select grout pipe sizes (and quantity) to obtain desired flow rates consistent with velocity limitations for the grout pipes.
- C. Cement grouting operations shall be done in the presence of the ENGINEER. Full access to all cementing equipment and gauges shall be provided to the ENGINEER's representative by the CONTRACTOR before, during, and after pumping operations.
- D. During all stages of cementing, the CONTRACTOR shall use a pre-flush or spacer of sufficient volume prior to pumping the cement grout. The CONTRACTOR shall submit the technical specifications of the pre-flush to the ENGINEER as part of the cementing plan submittal.
- E. Grout slurry placed by the tremie method shall use externally flush or externally upset joint steel tubing having an inside diameter of 1.0 inch or greater or size approved by the ENGINEER and shall be pumped through one pipe in the annulus. Grout pipe shall be withdrawn as the annulus is filled, and before the cement begins to set. Grout pipes shall be set not more than 3 feet above the top of the previous cement stage, as determined from tremie pipe hard tag and temperature geophysical log. The last tremie pipe single of the tremie pipe string during each cementing operation, including back plugging operations, shall be distinctively marked with a water-resistant method, to assist in accounting for all the tremie pipe string once each cementing operation is completed.
- F. Maintain a positive pressure on the casing during the 8 hours following the placement of cement. Well head pressure plan shall be a part of the casing cementing plan. The heating and cooling of the cement may require water to be added or released from the casing to maintain the required internal casing pressure.
- G. All casing string installations in the injection well shall be cemented using ASTM C-150 Type II or ASTM C595M-21 Type 1L cement, and no bentonite or any additives shall be used on the open borehole section, unless directed by the ENGINEER. The CONTRACTOR may use up to 6% bentonite (by weight) in the annular space between casing strings as follows:
 - 1. Cementing of the carbon steel casing for the injection well shall be as follows: neat cement will be pumped in the open borehole section and into the annulus until the base of the Underground Source of Drinking Water (USDW). The CONTRACTOR may use up to 6% bentonite (by weight) upon reaching the base of the USDW to land surface.
- H. During the pumping of each cement stage, the CONTRACTOR shall utilize the monitoring equipment required in 2.07(A) of this section. Measurements of cement weight shall be provided to the ENGINEER at frequent intervals prior to and during

cementing operations using either a densometer or mud scale. Consistency and mixing shall be approved by ENGINEER.

- I. During the pumping of each cement stage, the CONTRACTOR shall supply a secondary barrel counter for measuring/determining cement volumes installed.
- J. The cementing Contractor shall upon completion of cementing operations, immediately submit to the ENGINEER the Cement Specialist's written summary of the cement pumping operations. If cement pumping summary is not submitted before the Cement Specialist leaves the site, the CONTRACTOR shall not be paid for the individual cementing job.
- K. Standard pre-cement and cement bond logs will be required on the final 11.75-inch carbon steel seamless casing to determine if good bonding between the casing, cement, and 16-inch OD final steel casing is obtained. If the bond is unacceptable, remedial Work shall be performed to the satisfaction of the ENGINEER. In addition, the ENGINEER may request additional temperature, gamma, or cement bond logs to evaluate the effectiveness of any remedial cement grout Work performed. These operations shall be conducted at the CONTRACTOR's sole expense.
- L. The uppermost 300 feet of annulus in the injection well, or to the depth approved by the ENGINEER between the 16-inch outside diameter final injection well casing and the 11.75-inch carbon steel seamless casing, shall not be cemented until after the completion of the standard/modified cement bond log.

3.03 SETTING TIME

- A. No drilling operations will be permitted until the cement grout has thoroughly cured.
- B. Following cement placement, the casing and borehole shall remain undisturbed for a minimum of 8 hours prior to temperature geophysical logging.
- C. A minimum of 12 hours-setting time shall be required between successive cement lifts. Longer time may be necessary when high-yield cement is used.
- D. All cement grout lifts shall be physically tagged by tremie pipe and confirmed using a temperature/gamma log conducted before pumping a subsequent lift.
- E. The CONTRACTOR shall include cement grout curing time for each grout stage in the unit price of grout pumped in the Schedule of Values.
- F. After cementing is completed on a casing, casing and well must remain undisturbed for at least 24 hours for setting of the cement.

3.04 REMEDIAL WORK

- A. The CONTRACTOR shall be responsible for all remedial Work and related expenses in order to meet regulatory requirements and the Technical Specifications at no additional cost to the ENGINEER or OWNER. This shall include defective materials, accident, loss of equipment or equipment malfunction,

or for any other cause directly attributable to the CONTRACTOR. The ENGINEER shall be notified immediately in the event of a problem, and the following shall apply:

1. The CONTRACTOR shall, submit in writing to the ENGINEER, a method of correcting the problem. The ENGINEER shall review the method of corrective action; the CONTRACTOR shall not implement the corrective action until the plan is accepted by the ENGINEER.
2. All remedial Work shall be conducted in accordance with all applicable local, State, and Federal regulations.
3. Corrective Work shall be done at no additional cost to the ENGINEER or OWNER and shall not extend the length of the Contract.

3.05 WELL ABANDONMENT

- A. If the CONTRACTOR voluntarily stops Work, and/or fails to complete the well or borehole in accordance with governing regulations or the Contract Documents, the well will be considered abandoned. The CONTRACTOR shall not be paid for all or part of the well if declared abandoned by the ENGINEER.
- B. The CONTRACTOR shall propose their method of abandonment of the well or borehole in writing to the ENGINEER. The ENGINEER shall review the method of abandonment. The CONTRACTOR shall not proceed with well abandonment until the ENGINEER provides written approval of the CONTRACTOR's plan. The cost of properly plugging and sealing the well or borehole, in accordance with applicable local, State, or Federal regulations, shall be at the CONTRACTOR's sole expense. In addition, if a well or part thereof, does not have mechanical integrity, as defined by the appropriate regulatory authorities, it must be rectified before abandonment.
- C. The cost of post-abandonment monitoring, if required, shall be at the CONTRACTOR's sole expense.

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SECTION 33 26 11

MECHANICAL INTEGRITY TESTING

PART 1 GENERAL

1.01 RELATED WORK

- A. **Section 33 26 05 – Well Casing, Section 33 26 06 – Geophysical Logging, Section 33 26 07 – Grouting.**

1.02 SCOPE OF WORK

- A. This section covers the work, materials and equipment necessary to perform the mechanical integrity test on the injection well.

1.03 TEST REQUIREMENTS

- A. The CONTRACTOR shall perform Mechanical Integrity Test (MIT) to demonstrate well soundness prior to acceptance. Mechanical Integrity Tests will be conducted upon final completion of injection well and monitoring well in accordance with Florida Administrative Code (F.A.C) 62-528.300. The purpose of the MIT is as follows:
 - 1. Confirm integrity of casing (i.e., internal MIT).
 - 2. Confirm integrity of cement seal (i.e., external MIT).
- B. A well that fails any portion of the MIT may be unacceptable and subject to immediate repair in an acceptable manner or subject to abandonment and replacement at the CONTRACTOR's sole expense.
- C. The Work shall be performed by the CONTRACTOR using experienced and licensed personnel, as applicable, and with CONTRACTOR furnished equipment that is appropriate and adequate to complete all phases of the MIT testing.
- D. The CONTRACTOR and Geophysical Service SUBCONTRACTOR, if applicable, shall be currently licensed to transport and handle radioactive material in accordance with NRC and State regulations. The CONTRACTOR shall provide a qualified radiation safety officer to oversee geophysical logging operations where radioactive sources are present and used at the OWNER's well site.

1.04 CONTRACTOR SUBMITTALS

- A. **General:** All CONTRACTOR submittals shall conform to the applicable requirements of **Section 01 33 00 - Submittals** and the Supplementary requirements herein.

- B. SUBCONTRACTORS List: In the event that the CONTRACTOR intends to use a SUBCONTRACTOR(s) for any portion of the Work, a complete list of all proposed SUBCONTRACTORS shall be submitted to the ENGINEER in accordance with the General Conditions. Each SUBCONTRACTOR shall be approved by the ENGINEER. The CONTRACTOR may be required to submit additional information or a resume of qualifications for any of the SUBCONTRACTORS proposed. The ENGINEER reserves the right to disapprove the use of any SUBCONTRACTOR proposed.
- C. Instrument Calibrations: The CONTRACTOR shall submit calibration records for the totalizing flowmeter and pressure gauge furnished for use during the MITs:
 - 1. Flowmeter calibration records shall contain the following information:
 - a. Serial Number, Model Number, Gears, Test apparatus size, Meter reading and flow rate for at least three (3) steps, Percent error for each step, Tester's name, title, and date of test. Calibration shall be performed no greater than 60 days prior to testing.
 - 2. Pressure gauge calibration records shall contain the following information:
 - a. Serial Number, Model Number, Scale range, Meter reading and inches of mercury for at least three steps covering the entire range of the gauge, Percent error for each step, Tester's name and title. Calibration shall be performed no greater than 60 days prior to testing.
- D. Video Survey: Refer to **Section 33 26 06 - Geophysical Logging.**
- E. Geophysical Logging Tool Configuration: CONTRACTOR shall submit a diagram of the Radioactive Tracer Survey (RTS) logging tool, with description of the gamma ray detectors to the ENGINEER at least one week prior to its use. Refer to **Section 33 26 06 - Geophysical Logging.**
- F. Radioactive Iodine¹³¹: The CONTRACTOR shall submit to the ENGINEER a copy of the assay for radioactive tracer used in to conduct the radioactive tracer survey prior to introduction into the well.
- G. Records Required by Law: The CONTRACTOR shall maintain all records required by governmental agencies having jurisdiction, and shall submit such records to them as may be required.

1.05 CORRECTIVE WORK

- A. If it becomes necessary to perform corrective Work prior to final acceptance, on the injection well to meet either regulatory requirements, or the Technical Specifications and Contract Documents, or both, due to defective materials, accident, loss of equipment, or equipment malfunction, or for any other cause

directly attributable to the CONTRACTOR's actions, the CONTRACTOR shall bear the entire cost of the corrective Work, including any necessary Engineering Services and associated costs to support OWNER for compliance with permit and other regulatory requirements. Should the CONTRACTOR suspect or observe a condition where the Work does not comply with the Technical Specifications, the ENGINEER shall be notified immediately, and the following shall apply:

1. The CONTRACTOR shall propose a method of correcting the non-compliance, in writing, to the OWNER.
 2. The ENGINEER and OWNER shall review the method of corrective action proposed by the CONTRACTOR in a written Corrective Action Plan.
 3. If the CONTRACTOR's proposed corrective action is acceptable to the OWNER and ENGINEER, the ENGINEER will provide a written approval, after which, the CONTRACTOR may proceed with the Corrective Action Work. At all times all Work on the well must be in accordance with all applicable local, State and Federal regulations.
 4. The CONTRACTOR shall perform additional color video survey(s) of the entire well after all corrective actions are completed to verify that no damage was caused to the integrity of the well. The video survey(s) shall be performed to the satisfaction of the ENGINEER and OWNER.
- B. All Corrective Action Work resulting from the CONTRACTOR's non-conformance with the specifications, including all additional materials, labor, and equipment required, shall be furnished at the sole expense of the CONTRACTOR; no claim for additional time or compensation shall be made by the CONTRACTOR, except as specifically provided by the Contract Documents.

PART 2 PRODUCTS

2.01 GENERAL

- A. The CONTRACTOR's logging equipment shall be clean, well maintained, and in good operating condition when delivered to and placed into service at the drill site.
- B. Instruments of sufficient accuracy and resolution shall be furnished for use in testing as specified.
- C. All equipment shall be provided with safety devices as required by governmental authorities having jurisdiction.

2.02 EQUIPMENT

- A. Wellhead Equipment: The CONTRACTOR shall furnish and install a stripper head (wireline packoff) assembly used to conduct the color video survey,

geophysical logs, and RTS. The stripper head assembly shall be securely attached to the wellhead to prevent flow from the well at the pressures observed and recorded during drilling operations. The stripper head assembly furnished and installed shall be sized to accommodate the width and length of the longest geophysical tool or camera assembly used for conducting the tests and surveys. The CONTRACTOR shall furnish and install bleed and isolation valves so the stripper head assembly can be shut-in and isolated from the wellhead equipment. The assembly shall include a tee with 2-inch valve and appurtenances necessary for injecting potable water into the well during the surveys. The assembly shall include a pressure gauge and appurtenances for monitoring the pressure in the well during the tests.

- B. Water Supply Pipeline: The CONTRACTOR shall furnish and install a temporary potable freshwater supply pipeline for use during the video survey and the radioactive tracer survey in accordance with **Section 01 57 00 Construction Facilities and Temporary Controls**. The pipeline shall be equipped with a double check valve assembly (backflow preventer) to prevent the backflow of water from the well into the water supply source. The CONTRACTOR is not allowed to use saline surface water from the site as a source of water.
- C. A totalizing flowmeter (impeller type) shall be furnished and installed on the water supply pipeline. The flowmeter shall be capable of measuring flows accurately in the range of 17 to 28 gpm (approximately 3 to 5 fpm); flowmeter shall be accurate to 1.5 percent of full scale.
- D. If the water supply point of delivery does not yield the flow rate required for testing, the CONTRACTOR shall furnish water storage and pumping equipment for conducting the dynamic RTS and casing flushing. Water injection during the dynamic RTS will be at a velocity of 3 to 5 feet per minute in the final casing (approximately 17 to 28 gpm).
- E. The CONTRACTOR's pumping equipment and flow measuring devices shall be approved by the ENGINEER prior to their use. Flow measuring devices shall be calibrated and certified within 60 days prior to testing, and certification letter provided to the ENGINEER.

2.03 COLOR VIDEO SURVEY

- A. The color video camera to be used for the video survey will be of a type that is capable of focusing on hole and casing in diameters ranging from 6-inches to 36-inches. Camera lighting shall provide variable intensity illumination sufficient for illuminating borehole and casing. Camera shall be capable of transmitting digital video images with sharp contrast and good resolution. The video camera will be equipped with a wide-angle fixed lens for vertical down-hole views and a side-looking, rotating lens, for horizontal views of the well casing and borehole wall.

2.04 INFLATABLE PACKER CASING PRESSURE TEST

- A. CONTRACTOR shall furnish and install a pressure header for conducting the casing pressure test using down-hole inflatable packer. The header shall seal around the drill pipe supporting the inflatable packer and maintain pressure inside the casing being tested. CONTRACTOR'S wellhead equipment shall be approved by the ENGINEER prior to use.
- B. CONTRACTOR shall supply a Baker Single-Set Production Injection Packer, Baski, TAM J Packer; or approved equal. The packer shall be of a diameter appropriate for the size of well casing to be pressure tested. The packer shall seal tightly against the casing walls to prevent leakage and to effectively isolate the well casing from the open-hole below the casing. ENGINEER will be the sole judge as to the effectiveness of the packer element's' isolation of the well casing. The packer shall be run on drill pipe or tubing as approved by the ENGINEER.
- C. CONTRACTOR shall provide a minimum 6-inch diameter pressure gauge for use in the casing pressure tests. The gauge shall have a scale of 0 to 200 psi, a minimum increment of 1 psi and an accuracy of 0.25 percent. The gauge shall have a serial number easily located on its main body. The gauge shall be calibrated by an independent entity specializing in pressure gauge manufacturing and/or testing. A calibration certificate having the same serial number as found on the gauge to be furnished to provide to the ENGINEER within seven (7) days prior to testing, a calibration certificate as described in paragraph 1.3C, 2a. and shall have been calibrated within the previous 60 days.

2.05 GEOPHYSICAL LOGGING EQUIPMENT

- A. The geophysical recording equipment shall be capable of time driven recording with multiple settings for time interval adjustment. The presentation of the logs shall be such that the response remains on scale.
- B. The geophysical recording equipment shall be capable of printing log output in real time with background gamma ray log superimposed.
- C. The RTS logging tool shall be configured with three gamma detectors positioned one above and two below the ejector port, and a casing collar locator (CCL) device.
- D. One of the three gamma ray detectors on the RTS logging tool shall be used for the background gamma log.
- E. The tracer will be medicinal-grade Iodine¹³¹. Only tracer within one half-life of the production assay date will be used for the survey.
- F. All materials outside of the well that come in contact with the radioactive tracer shall be collected, containerized, and removed from the OWNER's property by the CONTRACTOR or the geophysical service company immediately. The collected materials shall be disposed of by the CONTRACTOR in accordance with applicable regulations for the handling, transporting and disposing of radioactive materials at no additional cost to the OWNER.

PART 3 EXECUTION

3.01 GENERAL

- A. Notification of Mechanical Integrity Testing: CONTRACTOR shall notify the ENGINEER at least 72-hours prior to initiating all MIT activities unless otherwise indicated. The ENGINEER will notify the FDEP.
- B. Disposal of Waste Fluids: The CONTRACTOR shall provide all facilities, equipment, and materials required for the removal of waste fluids from the well Site.
- C. Geophysical Logs: The geophysical logs will be run using digital down-hole tools and recording instruments with a resolution sufficient to detect the presence of radioactive tracer behind the well casing and annular cement. The high-resolution temperature probe will be checked by comparing the response to the temperature measured by a thermometer scaled in 1 degree increments immersed in the same medium. The logs will be run at no more than 30 feet per minute with a 2 second time constant. A repeat section will be run on a section representing a significant feature for each geophysical log to demonstrate repeatability and the sensitivity of the instrument. Refer to **Section 33 26 06 - Geophysical Logging**.

3.02 VIDEO SURVEY

- A. For a period of 24 hours and immediately prior to conducting the video survey, potable water will be pumped into the well at a rate specified by the ENGINEER through the 2-inch diameter valve located on the stripper head assembly. Potable freshwater shall be pumped into the well to clear the water column for the survey; the lower density freshwater, as compared to formation water, will also provide an upward buoyant force required for conducting the subsequent radioactive tracer survey. A minimum of three well volumes of potable freshwater shall be pumped into the well. If, after 24 hours of pumping potable water into the well, the concentration of particulates suspended in the water column does not permit a clear video of the well (casing and open-hole), the CONTRACTOR may be required to perform additional pumping and/or cleaning of the well to remove suspended solids to ensure the video survey produces a clear image for inspection of the well casing and open-hole.
- B. During the video survey, water will be pumped into the well at a flow rate of ranging from 20 to 250 gpm. Water will continue to be pumped throughout the survey. If during the video survey, the clarity of the water column declines, the CONTRACTOR shall stop the video survey to allow continued displacement down-hole of water containing solids. During the video survey, the CONTRACTOR shall stop the camera where potential defects in the casing and welds/couplings are observed to allow for thorough examination using the side-looking camera.

- C. After completing the down-hole run with the video camera, and upon reaching the total depth of the well, the CONTRACTOR shall remove the camera from the well, if the video survey is determined to be satisfactory by the ENGINEER. The CONTRACTOR shall provide 2 field copies of the video via USB 2.0 flash drive or OWNER's approved format.
- D. The video survey shall be performed by the CONTRACTOR or his qualified and approved subcontract service company.
- E. The video survey will be conducted in the presence of the ENGINEER.
- F. The video survey schedule for injection well I shall be as follows:
 - 1. Injection Well Video Survey Schedule

Injection Well Color Video Surveys
Open borehole and Final Well Inspection of 11.75-inch carbon steel seamless casing.

3.03 CASING PRESSURE TEST

- A. The CONTRACTOR shall install the testing packer at a depth approved by the ENGINEER, which shall be below the lowermost casing joint. The CONTRACTOR shall submit to the ENGINEER, a pipe tally, including down-hole equipment, to verifying the packer set depth. The packer tubing and well tubing or casing shall be sealed at the surface with a temporary wellhead capable of maintaining an air and water-tight seal exceeding the anticipated test pressure.
- B. The CONTRACTOR shall conduct a preliminary pressure test to ensure the equipment is free from leaks and operates properly. The CONTRACTOR shall notify the ENGINEER at least 24 hours before running the preliminary test. This test will be run following the same procedure and protocol as the acceptance pressure test described below.
- C. The acceptance pressure test shall be observed and certified in writing by the ENGINEER.
- D. Prior to beginning the pressurization, the casing and wellhead fittings shall be completely filled with water. Following pressurization, valves and fittings installed on the wellhead shall be bled to remove any remaining air; and pressure shall be bled and shut-in at the prescribed test pressure.
- E. The 60-minute duration pressure test shall be performed by the CONTRACTOR on the indicated casings or tubing to test the internal mechanical integrity of the well. The maximum allowable variation in observed pressure is ± 5 percent of the starting test pressure. If the pressure changes beyond the allowable pressure variation, or if leakage is observed in the piping or equipment, the CONTRACTOR shall take steps to locate the leak and make repairs in a manner satisfactory to the ENGINEER.

- F. Upon the conclusion of the pressure test, the CONTRACTOR shall slowly bleed off water pressure released from the casing during pressurization. The water shall be collected by the CONTRACTOR with the volume measured in a manner satisfactory to the ENGINEER.
- G. The pressure testing schedule for shall be as follows:
 - 1. Injection Well Pressure Testing Schedule

Injection Well Pressure Tests	
Casing Test	Target Pressure
11.75-inch carbon steel seamless casing	±150 psi

3.04 GEOPHYSICAL LOGGING

- A. Prior to conducting the RTS, the CONTRACTOR's designated radiation safety officer shall perform a background Geiger counter survey of the work site.
- B. Install on the wellhead a standpipe, stripping head, and other necessary piping for logging tool isolation and flow prevention from the final 11.75-inch carbon steel seamless casing. If the RTS is not conducted immediately following the completion of the color video survey, the well may need to be charged with freshwater.
- C. CONTRACTOR shall furnish, install, and operate temporary piping and pumping equipment for flushing the well.
- D. Prior to proceeding with RTS, flush the well by pumping three (3) casing volumes of potable water into the well.
- E. The well shall sit undisturbed for a minimum of 24 hours after pumping water and before commencing the background gamma ray log.
- F. Perform background gamma ray, temperature, and casing collar locator log (CCL) prior to loading the tool with 5 mCi of medicinal grade Iodine¹³¹.
- G. Load medicinal grade Iodine¹³¹ into the tool and prepare for the RTS.
- H. Perform dynamic RTS for evaluation of external mechanical integrity. Testing shall be completed as follows:
 - 1. After positioning the ejector port approximately 5 feet above the base of the casing, inject freshwater at a velocity of 3 to 5 fpm (17 to 28 gpm).

2. Eject 1 mCi of medical grade Iodine¹³¹ and monitor gamma ray detector count for 1 hour while the tool is held stationary and recording in time-drive mode.
 - a. In the event that the tracer is detected in the upper gamma detector at any time during time-drive logging, move the tool upward while logging to a point approximately 20 feet above the previous position and resume time-drive logging.
 - b. If upward tracer movement is detected, repeated the previous step until the tracer movement is no longer detected.
 3. Log upward out of position to a point 200 feet above the highest point at which tracer is detected.
 4. Flush the casing with one casing volume of water (approximately 13,350 gallons), less if the point of tracer eject returns to background gamma ray levels.
 5. Run a gamma ray log, following flushing, from 1 foot below the base of casing to at least 200 feet above the highest point at which tracer is detected.
 6. Perform a second dynamic RTS as previously described beginning at step number 1 above, except eject 2 mCi of medical grade Iodine¹³¹. The duration of the monitoring will be reduced to 30 minutes.
 7. Upon completion of the two dynamic RTS, lower the tool a minimum of 100 feet below the base of the casing, to a high transmissivity receiving zone, if possible, and eject the remaining tracer while flushing the well with a minimum of one casing volume of water and log upward out of position.
 8. Perform a final gamma ray log from the total completed depth of the well to land surface to confirm that tracer has been displaced from the well casing and has not migrated above the confining interval. Assess testing results and obtain RTS acceptance and approval from the regulatory representative prior to demobilization of RTS equipment. Additional RTS tests may be necessary to obtain regulatory acceptance and approval.
 9. Remove RTS tool from the well and perform a final Geiger survey of the site.
 10. Install injection wellhead and shut-in well.
- I. All logs shall be clearly labeled with all pertinent information regarding the well, location, depths, scales, etc. Provide the ENGINEER with two field copies at the time of logging and a PDF file. Provide one electronic copy of RTS files in LAS II or equivalent format and Adobe Acrobat (as a .pdf file).

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Section 40 05 19

DUCTILE IRON PIPE

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers the furnishing and installation of ductile iron pipe. Ductile iron pipe shall be furnished complete with all fittings, specials, adapters, closure pieces, blowoffs, outlets, caps and plugs, temporary bulkheads, access manholes, jointing materials, pipe hangers and supports, anchors, blocking, encasement, appurtenances, and accessories specified and indicated on the Drawings, and as required for proper installation and functioning of the piping.
- B. The size, service, and locations of ductile iron pipelines are covered in the Ductile Iron Pipe Schedule.
- C. Piping furnished hereunder shall be complete with all joint gaskets, bolts, nuts and other jointing materials required for installation of any valves and equipment furnished by Owner or others for installation under this Contract. Pipe hangers and supports, pressure and leakage testing, and cleaning and disinfection are covered in other sections. Pipe trenching, embedment, and backfill are covered in the Trenching and Backfilling section.

1.2 GOVERNING STANDARDS.

- A. Except as modified or supplemented herein, all ductile iron pipe, fittings, and specials shall conform to the applicable requirements of the following standards and other standards named in this section:

ANSI/AWWA Standards	Title
C151	Ductile-Iron Pipe, Centrifugally Cast, For Water
C600	Installation of Ductile Iron Water Mains and Their Appurtenances
M41	Ductile Iron Pipe and Fittings - Manual of Water Supply Practices
C104	Cement Mortar Lining for Ductile Iron Pipe and Fittings
C105	Polyethylene Encasement for Ductile Iron Pipe Systems
C110	Ductile-Iron and Gray-Iron Fittings
C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

C115	Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
C153	Ductile-Iron Compact Fittings

1.3 PIPE MANUFACTURER AND FIELD SERVICES.

- A. All ductile iron pipe, fittings, specials, bolts, gaskets, other jointing materials, and appurtenances shall be fabricated, lined, coated, and furnished under the direction and management of one pipe manufacturer. The pipe manufacturer responsibilities, which shall include, at a minimum; coordinating and furnishing all pipe materials, gaskets, bolts, and other jointing materials, and pipe appurtenances (except for furnished coupled joints and other similar products by a specified manufacturer) for a complete piping system that meets the specified test pressures and service conditions; ensuring and certifying that all pipe, fittings, specials, and other pipe materials, pipe gaskets and bolts specified herein, are being manufactured in full accordance with the Contract Documents; preparing and submitting all submittal information and shop drawings; and making any corrections that may be required to submittal information and shop drawings.
- B. The pipe manufacturer's minimum required experience qualifications shall include manufacture of interior and buried plant piping of similar diameters of at least two water or wastewater plants with joints, linings, and coatings suitable for the same or higher pressure rating, which has performed satisfactorily for the past 5 years.
- C. All ductile iron pipe shall be installed in accordance with the pipe manufacturer's recommendations.

1.4 SUBMITTALS.

- A. Drawings, details, specifications, and installation schedules covering all ductile iron pipe and accessories shall be submitted in accordance with the Submittals Procedures section. The drawings and data shall include, but shall not be limited to, the following:
 1. Certification of pipe manufacturer's experience requirements; to be submitted prior to award of contract.
 2. Certification by manufacturer (affidavit of compliance) for each item furnished in accordance with the ANSI/AWWA Standards.
 3. Restrained joints details.

4. Specifier. See the applicable specifier notes for discussion of when the following three optional paragraphs should be included.
5. Certification of gaskets by pipe manufacturer, certifying that gasket material is suitable for test pressures and services intended.
6. Certification that all materials in contact with treated or potable water are ANSI/NSF 61 approved.
7. Certification of joint lubricant.
8. Certification of proof-of-design tests for joints, including restrained joints.
9. Certification of proof-of-design tests for welded-on outlets and experience documentation. Air test documentation for the welded-on outlets used for this project.

10. Two samples of the polyethylene encasement, each sample clearly identified as required by the Governing Standards and test results from an independent third party laboratory of the requirements specified in ANSI/AWWA C105/A21.5.

11. The method that the Contractor proposes to use for measuring deflection of pipe joints.

- B. Submittal data shall clearly indicate the country of origin of pipe, fittings, flanges, restraining devices, and accessories. When requested by Engineer, certified copies of physical and chemical test results as outlined in ANSI/AWWA C151/A21.51 shall be submitted for the materials to be provided.

1.5 EMERGANCY REPAIR MANUAL.

Not used.

1.6 SPARE MATERIALS.

Not Used.

1.7 SHIPPING, HANDLING, AND STORAGE.

- A. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section, and as specified herein.

- B. Pipe, fittings, and accessories shall be handled in a manner that will ensure installation in sound, undamaged condition. Equipment, tools, and methods used in handling and installing pipe and fittings shall not damage the pipe and fittings. Hooks inserted in ends of pipe shall have broad, well-padded contact surfaces. Unpadded hooks, wire brushes or other abrasive tools shall not be permitted to come into contact with polyethylene lining if such lining is specified.
- C. Contractor-furnished pipe and fittings in which the lining has been damaged shall be replaced by and at the expense of Contractor. With the concurrence of Engineer, small and readily accessible damaged areas may be repaired.
- D. If the lining of Owner-furnished pipe or fittings is damaged by Contractor during unloading or handling, the damaged pipe or fittings shall be replaced by and at the expense of Contractor. Where the damaged areas are small and readily accessible, Contractor may be permitted to repair the lining.
- E. Contractor shall repair any damage to pipe coatings and linings before the pipe is installed.

PART 2 - PRODUCTS

2.1 PIPE CLASS.

- A. The class of ductile iron pipe shall be as indicated in the Ductile Iron Pipe Schedule. The specified class includes service allowance and casting allowance.

<u>Pipe Size</u>	<u>ANSI/AWWA Pressure Class</u>
<u>inches</u>	
64 thru 30	150
24	200
20 thru 14	250
12 and smaller	350

- B. Pipe wall thickness for grooved and threaded end pipe shall be increased if necessary to comply with the following minimum thickness:

<u>inches</u>	<u>Pipe Size</u>	<u>Minimum Thickness Class</u>	
		<u>Threaded Ends</u> (1)	<u>Grooved Ends</u> (2)
4-16		53	53
18		53	54
20		53	55
24		53	56
30-54		53	--
60 & 64		350 (3)	--

- (1) Complies with ANSI/AWWA C115/A21.15 for minimum pipe wall thickness for threaded flanges.
- (2) Complies with ANSI/AWWA C606 for grooved and shouldered joint ductile iron pipe.
- (3) Minimum class for 60 and 64 inch pipe is pressure class 350.

2.2 MATERIALS.

Pipe	Ductile iron, ANSI/AWWA C151/A21.51
Gaskets – All Joint Types	Synthetic rubber unless otherwise specified; natural rubber will not be acceptable. All gaskets shall be furnished by the pipe manufacturer unless another manufacturer’s product is indicated. Pipe manufacturer shall submit certificates of gasket suitability certifying that the gasket materials are compatible with the joints specified, are recommended for the specified field test pressure and service conditions. Gaskets for treated or potable water service shall be certified for chlorinated and chloraminated potable water. Gas and oil-resistant gaskets shall be made of Nitrile (NBR [Acrylonitrile Butadiene]) rubber. The name of the material shall be permanently marked or molded on the gasket. Gaskets shall also be certified as suitable where soils may be contaminated with gas and oil products.

Joint Lubricant		Vegetable-based lubricant recommended by the pipe manufacturer. Petroleum or animal-based lubricants will not be acceptable. Lubricants that will be in contact with treated or potable water shall be certified as being in compliance with ANSI/NSF 61.	
Fittings		ANSI/AWWA C110/A21.10 (except shorter laying lengths will be acceptable for U.S. Pipe), or ANSI/AWWA C153/A21.53, minimum working pressure rating as follows, unless indicated otherwise on the Drawings.	
<u>Fitting Size</u> in.	<u>Material</u>	<u>Type</u>	<u>Min. Working Pressure Rating,</u> psi
4 to 24	DI	Flanged joints	250
30 to 48	DI	All joints	250
54 to 64	DI	All joints	150
All fittings shall be ductile iron and suitable for the rated working pressure plus a surge or test pressure allowance of 100 psi or 1.5 times rated working pressure, whichever is less, without leakage or damage.			
Flanged Joints		ANSI/AWWA C115/A21.15.	
Flanges			
	Class 250 (Where identified on the Drawings)	Ductile iron, flat faced, with ANSI/ASME B16.1, Class 250 diameter and drilling.	
	All Others	Ductile iron, Class 125, ANSI/AWWA C115/A21.15.	
Flanges		All flanges shall be suitable for test pressure of 1.5 times rated pressure without leakage or damage.	
Bolts		ASTM A307, chamfered or rounded ends projecting 1/4 to 1/2 inch beyond outer face of nut.	
Nuts		ASTM A563, hexagonal, ANSI/ASME B18.2.2, heavy semifinished pattern.	
Gaskets		ASTM D1330, Grade I rubber, full face type, 1/8 inch thick unless otherwise required by pipe manufacturer and accepted by Engineer. Pipe manufacturer shall submit certification of gaskets furnished as indicated above under Gaskets - All Joint Types.	
Insulated Flanges			
Flanges		As specified herein, except bolt holes shall be enlarged as needed to accept bolt insulating sleeves.	
Insulation Kits		As manufactured by Advanced Products or Pipeline Seal and Insulator, Inc.	

	Insulating Gaskets	Type E, G-10, 1/8 inch [3 mm] thick, with Nitrile or EPDM sealing element for water and air service and Viton sealing elements for wastewater service unless otherwise required by pipe manufacturer and accepted by Engineer. Pipe manufacturer shall submit certification of gaskets furnished as indicated above under Gaskets - All Joint Types.
	Bolt Insulating Sleeves	G-10, 1/32 inch thick.
	Insulating Washers	G-10, 1/8 inch thick, two for each flange bolt.
	Backing Washers	Steel, 1/8 inch thick, two for each flange bolt.
Mechanical Joints		ANSI/AWWA C111/A21.11., with ductile iron glands.
	Restrained Mechanical Joints (factory prepared spigot), (4 inch through 48 inch), working pressure rating at least 250 psi.	American "MJ coupled Joints", or Griffin U.S. Pipe "Mech-Lok" (thru 36" size only).
	Restrained Mechanical Joints, (field cut spigot), (4 inch through 24 inch), working pressure rating 350 psi for 4 through 16 inch and at least 250 psi for 18 through 24 inch.	EBAA Iron "Megalug" Series 1100, Sigma "One Lok" SLDE series, or Star Pipe Products "StarGrip 3000" without exception.
Restrained mechanical joints shall be suitable for a test or working pressure plus surge pressure of the rated working pressure plus 100 psi		
	Wall Pipes or Castings	Mechanical joint with water stop and tapped holes; single casting or fabricated ductile iron pipe; holes sized in accordance with the details on the Drawings and provided with removable plugs.
	Mechanical Joints with Tie Rods	As indicated on the Drawings.
	Tie Rods	ASTM A307.
	Steel Pipe	ASTM A53, Schedule 40 or 80 as indicated on the Drawings.
	Washers	ANSI/ASME B18.22.1, plain steel.
Threaded Connections		ANSI/ASME B1.20.1, NPT; with boss or tapping saddle wherever wall thickness minus the foundry tolerance at the tapped connection is less than that required for 4-thread engagement as set forth in Table A.1, Appendix A, of ANSI/AWWA C151/A21.51.

Mechanical Couplings		
	Couplings	Dresser "Style 38"; Smith-Blair "411 Steel Coupling"; or Romac "Style 400" or "Style 501"; without pipe stop.
	Gaskets	Oil-resistant synthetic rubber gaskets shall be as recommended by the coupling manufacturer. Pipe manufacturer shall submit certification of gaskets furnished as indicated above under Gaskets - All Joint Types.
Restrained Mechanical Couplings		American Pipe "Restrained Coupling Gland Joint" coordinated with mechanical couplings furnished.
Restrained Flange Adapters		
	Restrained (4 inch through 24 inch). Unless otherwise indicated on the Drawings, flanged coupling adapters shall be restrained.	EBA Iron "Series 2100 Megaflange" or Romac "Style RFCA"
Flanged Coupling Adapters		[Not Used]
	Restrained (4 inch through 12 inch). Unless otherwise indicated on the Drawings, flanged coupling adapters shall be restrained.	Smith-Blair "Type 912" or Romac "Style FCA501", with anchor studs of sufficient size and number to withstand test pressures.
	Unrestrained (14 inch and larger)	Smith-Blair "Type 913" or Romac "Style FC400".
Dismantling Joints		
	Restrained (3 inch and larger) Unless otherwise indicated on the Drawings, dismantling joints shall be restrained.	Romac "DJ400"; Dresser "Style 131 Dismantling Joint" or Viking Johnson. For use in potable water systems, coating to be in accordance with NSF-61.
Tapping Saddles		Ductile iron, with stainless steel straps and synthetic rubber sealing gasket, 250 psi pressure rating.
Watertight/Dusttight Pipe Sleeves		GPT " Link-Seal", insulating type with modular rubber sealing elements, nonmetallic pressure plates, and stainless steel bolts and nuts.
Shop Coating and Lining		
	Cement Mortar Lining with Seal Coat	ANSI/AWWA C104/A21.4.
	Protective Fusion-Bonded	ANSI/AWWA C116/A21.16.
	Ceramic Epoxy Lining	Induron "Protecto 401 Ceramic Epoxy".

Glass Lining	Two-coat system applied over blast-cleaned surface; ground and finish coats separately fired; finished lining thickness at least 10 mils, Mohs' Hardness 5 to 6 density as determined by ASTM D792; U.S. PipeFast Fabricators, Inc. "MEH 32" or "SG-14", or C&B Piping "CBGL911".
Universal Primer	Manufacturer's standard. If in contact with treated or potable water, certify as being in compliance with ANSI/NSF 61.
Asphaltic Coating	Manufacturer's standard.
Zinc Coating	ISO 8179
Coal Tar Epoxy	Manufacturer's standard.
Liquid Epoxy	ANSI/AWWA C210, non-coal tar modified, or when in contact with treated or potable water, certify as being in compliance with ANSI/NSF 61.
Anti-Seize Thread Lubricant	Jet-Lube "Nikal", John Crane "Thred Gard Nickel", Bostik/Never-Seez "Pure Nickel Special" or Permatex "Nickel Anti-Seize".
Corrosion Protection	
Polyethylene Encasement	Seamless, ANSI/AWWA C105/A21.5; LLDPE - 8 mil [200 µm] or HDCLPE - 4 mil.
Heat-shrinkable Coating and Primer (Shrink Sleeve)	ANIS/AWWA C216, cross-linked polyethylene sheeting precoated with adhesive; minimum 80 mils; type and recovery as recommended by Shrink Sleeve manufacturer; Canusa-CPS or Berry Plastics Water Wrap.
Wax Tape and Primer	ANSI/AWWA C217, cold-applied petroleum wax primer and cold-applied petroleum wax tape; Trenton Wax-Tape and Primer.
Medium Consistency Tar	Coal Carboline "Bitumastic 50" or Tnemec "46-465 H.B. Tnemecol."

2.3 OUTLETS.

Not Used.

2.4 JOINTS.

- A. Joints in buried and tunnel locations shall be mechanical type unless otherwise indicated on the Drawings or where required to connect to existing piping or to valves. Bells on wall castings and wall sleeves shall be mechanical joint type, with tapped holes for tie rods or stud bolts. All other joints shall be flanged unless otherwise indicated on the Drawings.
- B. Certification of joint design shall be provided in accordance with ANSI/AWWA C111/A21.11, Performance Requirements, as modified herein. The joint test pressure shall be not less than 2 times the working

pressure rating of the joint. The same certification and testing shall also be provided for restrained joints. For restrained joints, the piping shall not be blocked to prevent separation and the joint shall not leak or show evidence of failure. It is not necessary that such tests be made on pipe manufactured specifically for this project. Certified reports covering tests made on other pipe of the same size and design as specified herein and manufactured from materials of equivalent type and quality may be accepted as adequate proof of design. Any new proof-of-design testing to meet the requirements for this project shall be independently verified and the Owner shall be given the opportunity to witness the testing.

- C. Unless otherwise indicated on the drawings or acceptable to the Engineer, field closure pieces shall be located away from the bends or dead ends beyond the length over which joints are to be restrained.
- D. The length of pipe having restrained joints shall be as indicated on the drawings or specified. All vertical bends and eccentric reducers shall have restrained joints.

2.5 FLANGED JOINTS.

- A. Pipe shall extend completely through screwed-on flanges. The pipe end and flange face shall be finish machined in a single operation. Flange faces shall be flat and perpendicular to the pipe centerline.

2.6 FLANGED COUPLING ADAPTERS.

Not used.

2.7 DISMANTLING JOINTS.

- A. Dismantling joints shall be provided for restrained couplings 6 inch and larger piping where indicated on the Drawings and as specified herein. Dismantling joints shall comply with AWWA C219 and shall be restrained flange by flange couplings manufactured as a single unit. Unless otherwise indicated on the Drawings, dismantling joints shall be restrained.
- B. The inner and outer surfaces of dismantling joints, except flange mating surfaces, shall be prepared for coating in accordance with instructions of the coating manufacturer and shall then be shop coated with liquid epoxy in accordance with ANSI/AWWA C210. The flange mating surfaces shall be cleaned and shop primed with universal primer.

2.8 MECHANICAL COUPLINGS.

- A. The piping layout for mechanical couplings shall provide a space of at least 1/4 inch, but not more than 1 inch, between the pipe ends.
- B. All surfaces, including the interior surfaces of the middle rings, shall be prepared for coating in accordance with instructions of the coating

manufacturer and shall be shop coated with 16 mils liquid epoxy in accordance with ANSI/AWWA C210.

- C. A ductile iron pipe factory spacer shall be provided for the piping where indicated on the drawings. The spacer shall be shop lined and coated with 16 mils of liquid epoxy. Piping surfaces within the coupling shall be shop coated with 16 mils of liquid epoxy.
- D. Tie bolts shall be provided to restrain mechanical coupling connections where indicated on the Drawings. The connecting pipe shall be furnished with welded retainer rings as recommended by pipe manufacturer. The pipe manufacturer shall also coordinate the restrained connection with the pressure rating, length, and diameter dimensions of the mechanical coupling being furnished to assure proper clearance is provided for completing the restrained coupling installation.

2.9 GROOVED-END COUPLINGS.

Not used.

2.10 REDUCERS.

- A. Reducers shall be eccentric or concentric as indicated on the Drawings. Reducers of eccentric pattern shall be installed with the straight side on top, so that no air traps are formed.

2.11 BLOWOFFS.

Not used.

2.12 ACCESS OPENINGS.

Not used.

2.13 WALL AND FLOOR PIPES.

Not used.

2.14 WALL AND FLOOR SLEEVES.

Not used.

2.15 SHOP COATING AND LINING.

- A. The interior of all pipe and fittings, unless noted otherwise, shall be cement mortar lined.

- B. The exterior surfaces of all pipe and fittings which will be exposed in both interior and exterior locations shall be shop primed. Flange faces shall be coated with a suitable rust-preventive compound. Exterior surfaces of all other pipe and fittings shall be coated with asphaltic coating.

PART 3 – EXECUTION

3.1 INSPECTION.

- A. Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation; pipe ends shall be examined with particular care. All defective pipe and fittings shall be removed from the site.

3.2 PROTECTION AND CLEANING.

- A. The interior of all pipe and fittings shall be thoroughly cleaned of all foreign material prior to installation and shall be kept clean until the work is completed. Before jointing, all joint contact surfaces shall be wire brushed if necessary and wiped clean.
- B. Precautions shall be taken to prevent foreign material from entering the pipe during installation. Debris, tools, clothing, or other objects shall not be placed in or allowed to enter the pipe.
- C. Whenever pipe laying is stopped, the open end of the pipe shall be closed to prevent entry of dirt, mud, rodents, and other material. All water in the trench shall be removed prior to removing the closure.

3.3 CUTTING PIPE.

- A. Cutting shall be done in a neat manner, without damage to the pipe or the lining. Cuts shall be smooth, straight, and at right angles to the pipe axis. After cutting, the ends of the pipe shall be dressed with a file or a power grinder to remove all roughness and sharp edges. The cut ends of push-on joint pipe shall be suitably beveled.
- B. All field cutting of existing gray cast iron pipe shall be done with mechanical pipe cutters, except where the use of mechanical cutters would be difficult or impracticable.
- C. Ends of ductile iron pipe shall be cut with a portable guillotine saw, abrasive wheel, saw, milling cutter, or oxyacetylene torch. The use of hydraulic squeeze type cutters will not be acceptable. Field-cut holes for saddles shall be cut with mechanical cutters; oxyacetylene cutting will not be acceptable.

- D. Contractor shall use factory prepared pipe ends unless a field cut is required for connections.

3.4 ALIGNMENT AND GRADE.

- A. Buried piping shall be laid to the lines and grades indicated on the Drawings and as specified. Pipelines or runs intended to be straight shall be laid straight. Deflections from a straight line or grade shall not exceed the values stipulated for full-length push-on joint pipe for full-length mechanical joint pipe of AWWA C600, unless specially designed bells and spigots are provided. Contractor shall submit his proposed methods to measure deflection of deflected joints in accordance with the Submittal section.
- B. Whenever deflections would exceed the values stipulated in AWWA C600, either shorter pipe sections or fittings shall be installed where needed to conform to the alignment or grade indicated on the Drawings and as acceptable to the Engineer.
- C. Unless otherwise specified or acceptable to Engineer, laser beam equipment, surveying instruments, or other suitable means shall be used to maintain alignment and grade. At least one elevation reading shall be taken on each length of pipe. If laser beam equipment is used, periodic elevation measurements shall be made with surveying instruments to verify accuracy of grades. If such measurements indicate thermal deflection of the laser beam due to differences between the ground temperature and the air temperature within the pipe, precautions shall be taken to prevent or minimize further thermal deflections.
- D. Additional requirements for alignment and grade are covered in the Project Requirements and Trenching and Backfilling sections and on the Drawings.
- E. Tolerances. Each section of pipe shall be laid to the alignment and grade indicated on the Drawings and pipe laying schedule with pipe ends within the following tolerances;
 - +/- 0.10 foot in grade at any point
 - +/- 0.20 foot in alignment at any point
- F. In addition, piping shall be visually straight or on a smooth curve between the points of deflection or curvature indicated on the Drawings. Stricter tolerances than specified above shall be used as necessary to maintain minimum cover, to maintain required clearances, to make connections to existing pipe, to maintain the correct slope to avoid high or low points along the pipeline other than at locations indicated on the Drawings, or to meet other restrictions as required or directed by the Engineer.

3.5 LAYING PIPE.

- A. Buried pipe shall be protected from lateral displacement by placing the specified pipe embedment material installed as specified in the Trenching and Backfilling section. Under no circumstances shall pipe be laid in water, and no pipe shall be laid under unsuitable weather or trench conditions. Pipe embedment material and trench backfill shall be placed and compacted under and around each side of outlets and fittings to hold the pipe in proper position and alignment during the subsequent pipe jointing, embedment, and backfilling.
- B. Pipe shall be laid with the bell ends facing the direction of laying, except where reverse laying is specifically acceptable to Engineer.

3.6 JOINTS.

- A. Each joint, including restrained joints, shall be checked by Contractor as recommended by the pipe manufacturer to verify that the joint and the restraints are installed properly. Restrained joints shall be extended after they are assembled to minimize further take-up.

3.7 MECHANICAL JOINTS.

Not used.

3.8 PUSH-ON JOINTS.

Not used.

3.9 FLANGED JOINTS.

- A. When bolting flanged joints, care shall be taken to avoid restraint on the opposite end of the pipe or fitting which would prevent uniform gasket compression or would cause unnecessary stress in the flanges. One flange shall be free to move in any direction while the flange bolts are being tightened. Bolts shall be tightened gradually in a crisscross pattern and at a uniform rate, to ensure uniform compression of the gasket around the entire flange. All flange joint bolting procedures shall be in accordance with the pipe manufacturer's recommendations.
- B. Special care shall be taken when connecting piping to any pumping equipment to ensure that piping stresses are not transmitted to the pump flanges. All connecting piping shall be permanently supported to obtain accurate matching of bolt holes and uniform contact over the entire surface of flanges before any bolts are installed in the flanges.

- C. Pump connection piping shall be free to move parallel to its longitudinal centerline while the bolts are being tightened. Each pump shall be leveled, aligned, and wedged into position which will fit the connecting piping, but shall not be grouted until the initial fitting and alignment of the pipe, so that the pump may be shifted on its foundation if necessary to properly install the connecting piping. Each pump shall, however, be grouted before final bolting of the connecting piping.
- D. After final alignment and bolting, the pump connections shall be tested for applied piping stresses by loosening the flange bolts which, if the piping is properly installed, should result in no movement of the piping relative to the pump or opening of the pump connection joints. If any movement is observed, the piping shall be loosened and re-aligned as needed and then the flanges bolted back together. The flange bolts shall then be loosened and the process repeated until no movement is observed.
- E. Insulated Flanged Joints.
 - 1. Insulated flanged joints shall be installed where indicated on the Drawings. In addition to one full-faced insulated gasket, each flange insulating assembly shall consist of one full-length sleeve, two insulating washers, and two backing washers for each flange bolt. The insulating gasket ID shall be 1/8 inch [3 mm] less than the ID of the flange in which it is installed. The insulated flanged joint accessories shall be installed in accordance with the instructions and recommendations of the insulating kit manufacturer.

3.10 FLANGED COUPLING ADAPTERS.

- A. Flange coupling adapters shall be installed in accordance with the coupling manufacturer's recommendations. After the pipe is in place and bolted tight, the locations of holes for the anchor studs shall be determined and the pipe shall be field-drilled. Holes for anchor studs shall be drilled completely through the pipe wall. Hole diameter shall be not more than 1/8 inch [3 mm] larger than the diameter of the stud projection. Unless indicated on the Drawings, all flange coupling adapters shall be restrained.

3.11 DISMANTLING JOINTS.

- A. Dismantling joints shall be installed in accordance with the coupling manufacturer's recommendations.

3.12 MECHANICAL COUPLINGS.

- A. Mechanical couplings shall be installed in accordance with the coupling manufacturer's recommendations. A space of at least 1/4 inch, but not more than 1 inch, shall be left between the pipe ends. Pipe and coupling surfaces in contact with gaskets shall be clean and free from dirt and other foreign matter during assembly. All assembly bolts shall be uniformly tightened so that the coupling is

free from leaks, and all parts of the coupling are square and symmetrical with the pipe. Following installation of the coupling, damaged areas of shop coatings on the pipe and coupling shall be repaired to the satisfaction of Engineer.

3.13 GROOVED-END JOINTS.

Not used.

3.14 GAS AND OIL-RESISTANT GASKETS.

- A. Gas and oil-resistant gaskets shall be installed where specified, indicated on the Drawings, or directed by Engineer where jointing gaskets may be subject to permeation when piping passes through areas where soil may be contaminated with gas or petroleum (oil) products or organic solvents or their vapors.

3.15 CORROSION PROTECTION.

Not used.

3.16 PROVISIONS FOR CATHODIC PROTECTION SYSTEMS.

Not used.

3.17 CONNECTIONS WITH EXISTING PIPING.

- A. Connections between new work and existing piping shall be made using fittings suitable for the conditions encountered. Each connection with an existing pipe shall be made at a time and under conditions which will least interfere with service to customers, and as authorized by Owner. Facilities shall be provided for proper dewatering and for disposal of all water removed from dewatered lines and excavations without damage to adjacent property.
- B. Special care shall be taken to prevent contamination when dewatering, cutting into, and making connections with existing potable water piping. Trench water, mud, or other contaminating substances shall not be permitted to enter the lines. The interior of all pipe, fittings, and valves installed in such connections shall be thoroughly cleaned and then swabbed with, or dipped in, a 500 mg/L chlorine solution.

3.18 CONCRETE ENCASEMENT.

Not used.

3.19 REACTION ANCHORAGE AND BLOCKING.

Not used

3.20 PRESSURE AND LEAKAGE TESTS.

- A. After installation, pipe and fittings shall be subjected to a pressure test and a leakage test. The Contractor shall provide all necessary pumping equipment; piping connections between the piping and the nearest available source of test water; pressure gauges; and other equipment, materials, and facilities necessary for the tests. The minimum test pressure shall be 120 psi or as indicated on the Drawings
- B. All pipe, fittings, valves, pipe joints, and other materials which are found to be defective shall be removed and replaced with new and acceptable materials, and the affected portion of the piping shall be retested by and at the expense of Contractor.
- C. All joints shall be watertight and free from visible leaks. Any visible leak which is discovered within the correction period stipulated in the General Conditions shall be repaired by and at the expense of Contractor.

3.21 CLEANING AND DISINFECTION.

- A. The interior of all pipe and fittings shall be thoroughly cleaned before installation and shall be kept clean of any foreign matter until the work has been accepted. All joint contact surfaces shall be kept clean until the joint is completed.

End of Section

Section 40 05 23

STAINLESS STEEL PIPE AND ALLOY PIPE, TUBING, AND ACCESSORIES

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers the furnishing of stainless-steel pipe and alloy pipe, tubing and accessories through 24" diameter for the services as indicated herein. Pipe and tubing shall be furnished complete with all fittings, flanges, unions, and other accessories specified herein.

1.2 SUBMITTALS.

- A. Drawings and Data. Complete specifications, data, and catalog cuts or drawings shall be submitted in accordance with the Submittals Procedures section. Submittals are required for all piping, fittings, gaskets, sleeves, and accessories, and shall include the following data:

- Name of Manufacturer
 - Type and model
 - Construction materials, thickness, and finishes
 - Pressure and temperature ratings

- B. Contractor shall obtain and submit a written statement from the gasket material manufacturer certifying that the gasket materials are compatible with the joints specified herein and are recommended for the specified field test pressures and service conditions.
- C. All welding and brazing procedures and operators shall be qualified by an independent testing laboratory in accordance with the applicable provisions of Section IX of the ASME Code. All procedure and operator qualifications shall be in written form and submitted to the Engineer for review.
- D. Pipe for liquid chemical service shall comply with ASME B31.3. Pipe for all other services shall comply with ASME B31.1.

1.3 DELIVERY, STORAGE, AND HANDLING.

- A. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section. All materials shall be stored in a sheltered location above the ground, separated by type, and shall be supported to prevent sagging or bending.

PART 2 - PRODUCTS

2.1 MATERIALS.

A. Stainless steel pipe and alloy pipe materials shall be as specified herein.

1. Material Classification SS-1.

SS – Schedule 40 with Beveled Ends 2-1/2 inch and larger.	Pipe Fittings ASTM A312, Grade TP316L. Buttwelded, ASTM A403, WP316L. Fittings shall conform to ANSI/ASME B16.9, Schedule 40 with beveled ends.
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2. Material Classification SS-2. Not used.

3. Material Classification SS-3. Not used.

4. Material Classification SS-4. Not used.

5. Material Classification SS-5. Not used.

6. Material Classification SS-6. Not used.

7. Material Classification SS-7. Not Used

8. Material Classification SS-8. Not used.

9. Material Classification SS-9. Not used.

10. Material Classification SS-10. Not used.

11. Material Classification SS-11. Not used.

12. Material Classification CRP-1. Not used.

13. Material Classification HST-1. Not used.

14. Accessory Materials.

- a. Accessory materials for the stainless steel pipe systems shall be as indicated. Flanges shall be flat faced for water service and shall be raised face for air or gas service except when connecting to flat face equipment or valve flanges.

Flanges

SS-1, SS-2 and SS-3
Pipe Backing Flanges

Stainless steel plate, AISI Type 304 or 316 to match fittings. Provide stub ends or angle face rings with material and thickness to match fittings. The angle or radius between the angle face ring or stub end and the pipe shall match the angle or radius of the backing flange for proper seating. Flanges shall conform with ANSI/ASME B16.5, Class 300 diameter and drilling; with the following thicknesses:

Nominal Pipe Size inches [mm]	Flange Thickness inches
1/2-8 [13-200]	1/2
10-16 [250-400]	5/8
18-20 [450-500]	3/4
24-30 [600-750]	1
36 [900]	1 1/4

SS-4 and SS-5 Pipe
Flanges

ANSI/ASME B16.5, Class 150, AISI Type 304, 304L, 316, or 316L, to match piping.

SS-10 Pipe Flanges

Except where otherwise permitted or required, ANSI/AWWA C207, Class D, slip-on constructed of stainless steel plate or ANSI/ASME B16.5, Class 150, AISI Type 304, 304L, 316, or 316L, to match piping.

SS-11 Pipe Backing
Flanges

Epoxy coated carbon steel to match fittings. Provide stub ends or angle face rings with material and thickness to match fittings. The angle or radius between the angle face ring or stub end and the pipe shall match the angle or radius of the backing flange for proper seating. Flanges shall conform with ANSI/ASME B16.5, Class 150 diameter and drilling; with the following thicknesses:

Nominal Pipe Size inches [mm]	Flange Thickness inches [mm]
1/2-8 [13-200]	1/2 [13]
10-16 [250-400]	5/8 [16]
18-20 [450-500]	3/4 [19]
24-30 [600-750]	1 [25]
36 [900]	1-1/4 [32]

Flange Bolts	ASTM A193 Class 2, AISI Type 304, ANSI B18.2.1, heavy hex head, length such that, after installation, the bolts will project 1/8 to 3/8 inch [3 to 10 mm] beyond outer face of the nut.
Flange Nuts	ASTM A194, AISI Type 304, ANSI/ASME B18.2.2, heavy hex pattern. Washers shall be installed under the nuts.
All other services.	Flexitalic "Style CG", spiral wound, AISI Type 304 stainless steel, non-asbestos filler, 3/16 inch [5 mm] nominal thickness, with compression ring 1/8 inch [3 mm] thick to match required flange dimensions.
Elbows	Except for elbows in chemical service lines 4 inches [100 mm] and smaller, elbows shall be long radius type for which the laying length is 1.5 times the pipe diameter.
Insulating Fittings	
Threaded	Dielectric steel pipe nipple, ASTM A53, Schedule 40, polypropylene lined, zinc plated; Perfection Corp. "Clearflow Fittings".
Flanged	EpcO "Dielectric Flange Unions" or Central Plastics "Insulating Flange Unions".

2.2 BRANCH CONNECTIONS.

- A. Branch connections 2-1/2 inches and smaller shall be made with welding fittings. Welded outlets shall be used. Where the exact outlet size desired is in doubt, but is known to be less than 1 inch, a 1 inch outlet shall be provided and reducing bushings used as needed.
- B. Branch connections sized 3 and larger shall be made with pipe nipples or with welding fittings with welded outlets. Pipe nipples and welding fittings shall be welded to the pipe shell and reinforced as needed to meet design and testing requirements. The pressure rating of branch and branch connections shall equal or exceed the pressure rating of the main pipe it is connected to.
- C. Small branch connections shall be so located that they will not interfere with joints, supports, or other details, and shall be provided with caps or plugs to protect the threads during shipping and handling.

2.3 WELDING OF STAINLESS STEEL AND ALLOYS.

- A. Filler metal for welding austenitic stainless steel and alloys, P-number 8 base materials shall be in accordance with the following:

Material Type/Grade 304 shall use Type 308 filler metal.

Material Type/Grade 304L shall use Type 308L filler metal.

Material Type/Grade 316, shall use Type 316 filler metal.

Material Type/Grade 316L shall use Type 316L filler metal.

Material Type/Carpenter 20 shall use Carpenter 20 filler metal.

Material Type/Hastelloy C276 shall use Hastelloy C276 filler metal.

- B. The following requirements shall apply when fabricating austenitic stainless steel and alloy components.

1. Grinding shall be by aluminum oxide, zirconium oxide, or silicon carbide grinding wheels that shall not have been used on carbon or low alloy steels. Hand or power wire brushing shall be by stainless steel brushes that shall not have been used on carbon or low alloy steels for stainless steel pipe. Hand or power wire brushing shall be by Carpenter 20 brushes that shall not have been used on carbon or low alloy steels for Carpenter 20 pipe. Hand or power wire brushing shall be by Hastelloy C276 brushes that shall not have been used on carbon or low alloy steels for Hastelloy C276 pipe. All tools used in fabrication shall be protected to minimize contact with steel alloys or free iron. Grinding wheels and brushes shall be identified and controlled for their use on these materials only to ensure that contamination of these materials does not occur.

2. Antispatter compounds, marking fluids, marking pens, tape, temperature indicating crayons, and other tools shall have a total halogen content of less than 200 parts per million.

3. Heat input control for welding shall be specified in the applicable WPS and shall not exceed 55,000 joules per inch (22,000 joules per cm) as determined by the following formula:

i.
$$\text{Heat Input (J/in.)} = \frac{\text{Voltage} \times \text{Amperage} \times 60}{\text{Travel Speed (in./min.)}}$$

4. Complete penetration pressure retaining welds shall be made using the Gas Tungsten Arc Welding (GTAW) process for the root and second layer as a minimum.
5. Austenitic stainless steel instrument tubing shall be welded using only the GTAW process.
6. Socket welds or butt welds in all austenitic stainless steel instrument tubing lines shall require an inert gas backing (purge) using argon during welding to avoid oxidation.
7. The application of heat to correct weld distortion and dimensional deviation without prior written approval from the Engineer is prohibited.
8. Unless otherwise approved in writing, the GTAW process shall require the addition of filler metal.
9. The maximum preheat and interpass temperature for austenitic stainless steel shall be 350° F (176° C). The minimum preheat temperature shall be 50° F (10° C).
10. Complete joint penetration welds welded from one side without backing, weld repairs welded from one side without backing, or weld repairs in which the base metal remaining after excavation is less than 0.1875 inch (5 mm) from being through wall, which are fabricated from austenitic stainless steel ASME P-number 8 base metal or unassigned metals with similar chemical compositions, shall have the root side of the weld purged with an argon backing gas prior to welding. Backing gas (purge) shall only be argon. The argon backing gas shall be classified as welding grade argon or shall meet Specification SFA-5.32, AWS Classification SG-A. The backing gas (purge) shall be maintained until a minimum of two layers of weld metal have been deposited.

2.4 SHOP CLEANING AND PICKLING OF STAINLESS STEEL PIPING AND WELDS.

- A. All stainless steel piping shall be thoroughly cleaned and pickled at the mill in accordance with ASTM A380.
- B. Pickling shall produce a modest etch and shall remove all embedded iron and heat tint. After fabrication, pickled surfaces shall be subjected to a 24 hour water test or a ferroxyl test to detect the presence of residual embedded iron. All pickled surfaces damaged during fabrication including welded areas shall either be mechanically cleaned or repickled or passivated in accordance with ASTM A380. Materials that have been contaminated with steel alloys or free iron shall not be used until all

contamination is removed. When cleaning to remove steel or iron contamination is required, it shall be performed in accordance with ASTM A380, Code D requirements. Mechanical cleaning is not an acceptable cleaning method for oxygen or ozone piping. Oxygen and ozone piping shall be repickled or passivated as specified herein. All stainless steel surfaces shall be adequately protected during fabrication, shipping, handling, and installation to prevent contamination from iron or carbon steel objects or surfaces. Particulate matter shall be removed from piping and welds. Labels shall be affixed to the piping sections to indicate shop cleaning has been performed. Welds shall be either mechanically cleaned or pickled or passivated on the exterior of the pipe.

- C. For buried piping, at least the exterior of all welds shall be passivated.

2.5 HIGH TEMPERATURE EPOXY COATING.

Not used.

2.6 INSULATING FITTINGS.

- A. In all piping, insulating fittings shall be provided to prevent contact of dissimilar metals, including but not limited to, contact of copper, brass, or bronze pipe, tubing, fittings, valves, or appurtenances, or stainless steel pipe, tubing, fittings, valves, or appurtenances with iron or steel pipe, fittings, valves, or appurtenances. Insulating fittings shall also be provided to prevent contact of copper, brass, or bronze pipe, tubing, fittings, valves or appurtenances with stainless steel pipe, tubing, fittings, valves, or appurtenances.
- B. Insulating fittings shall be tested in dry conditions in accordance with manufacturer recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION.

- A. Materials furnished under this section will be installed in accordance with the Injection Well Casing Section.

END OF SECTION

Section 40 05 24.43

MISCELLANEOUS STEEL PIPE, TUBING, AND ACCESSORIES

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers the furnishing of miscellaneous steel pipe, tubing and accessories that for pipe diameters 24 inches [600 mm] and smaller. Pipe and tubing shall be furnished complete with all fittings, flanges, unions, and other accessories specified herein.

1.2 GENERAL.

- A. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1.3 SUBMITTALS.

- A. Drawings and Data. Complete specifications, data, and catalog cuts or drawings shall be submitted in accordance with the Submittals Procedures section. Submittals are required for all piping, fittings, gaskets, sleeves, and accessories, and shall include the following data:

- Name of Manufacturer
 - Type and model
 - Construction materials, thickness, and finishes
 - Pressure and temperature ratings

- B. Contractor shall obtain and submit a written statement from the gasket material manufacturer certifying that the gasket materials are compatible with the joints specified herein and are recommended for the specified field test pressures and service conditions.

1.4 DELIVERY, STORAGE, AND HANDLING.

- A. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section. All materials shall be stored in a sheltered location above the ground, separated by type, and shall be supported to prevent sagging or bending.

- B. Coated Pipe. Handling methods and equipment used shall prevent damage to the protective coating and shall include the use of end hooks, padded calipers, and nylon or similar fabric slings with spreader bars. Bare cables, chains, or metal bars shall not be used. Coated pipe shall be stored off the ground on wide, padded skids. Plastic coated pipe shall be covered or otherwise protected from exposure to sunlight.

PART 2 - PRODUCTS

- 2.1 GALVANIZED STEEL PIPE. Not used.
- 2.2 STEEL PIPE. Steel pipe materials and service shall be as specified herein.
 - A. Material Classification CS-1. Not used.
 - B. Material Classification CS-2. Not used.
 - C. Material Classification CS-3.

This material classification is for the Carbon Steel Seamless Casing referenced in Section 33 26 05.

<p>[CS – Standard Weight Steel with Buttwelded Fittings.</p> <p>Aeration air piping. Natural or LP gas piping, buried or interior locations. Steam and condensate piping. Sodium hydroxide solution piping, interior locations or outdoors above grade. Sodium hydroxide solution piping, interior locations or outdoors above grade. Compressed air supply piping up to 250 psig [1725 kPa gauge]. Fuel oil or diesel fuel piping in interior locations or outdoors above grade. Heating water system piping. Chilled water system piping. Methanol piping.</p> <p>2-1/2 inch [63 mm] and larger.</p>	<p>Pipe ASTM A53/A106, Type S, standard weight Grade B; Bevel ends.</p> <p>Fittings Buttwelded. Fitting shall conform to ANSI/ASME B16.9, standard weight.</p>
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- D. Material Classification CS-4. Not used.
- E. Material Classification CS-5. Not used.
- F. Material Classification CS-6. Not used.
- G. Material Classification CS-7. Not used.
- H. Material Classification CS-8. Not used.
- I. Material Classification CS-9. Not used.
- J. Material Classification CS-10. Not used.
- K. Material Classification CS-11. Not used.
- L. Material Classification CS-12. Not used.
- M. Material Classification CS-13. Not used.
- N. Material Classification CS-14. Not used.
- P. Accessory Materials. Accessory materials for the miscellaneous steel pipe and tubing systems shall be as indicated.

Nipples	ASTM A733, seamless, extra strong (Schedule 80); "close" nipples will be permitted only by special authorization in each case.
Unions (Malleable Iron)	Fed Spec WW-U-53I, Class 2; Type B (galvanized) for galvanized pipe or Type A (black) for ungalvanized pipe.
Flanges	
Standard Weight Pipe	ANSI/ASME B16.5, Class 300, flat faced when connected to flat faced flanges; otherwise, raised face.
Flange Bolts and Nuts	ASTM A193, Grade B7 with ASTM A194 Grade 2H nuts. Length such that, after installation, the bolts will project 1/8 to 3/8 inch [3 to 10 mm] beyond outer face of the nut.
Flange Gaskets	

Flat Faced Flanges	Premium Grade, EPDM, full face, 1/8 inch [3 mm] thick, rated for 275°F [135°C] service; Garlock "8314".
For Water Service	ASTM D1330, Grade I, red rubber, ring type, 1/8 inch [3 mm] thick.
For Other Services	
Flat Faced Flanges	Non-asbestos filler with neoprene or nitrile binder; dimensions to suit flange contact face; 1/16 inch [1.5 mm] minimum thickness for plain finished surfaces, 3/32 inch [2 mm] minimum thickness for serrated surfaces.

PART 3 - EXECUTION

3.1 INSTALLATION.

- A. Materials furnished under this section will be installed in accordance with the Injection Well Casing section.

End of Section