SECTION 01 11 13

WORK COVERED BY CONTRACT DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Definitions.
2. Work Covered by Contract Documents.
3. Cash Allowances.
4. Owner-Furnished Products.
5. Document Management Software
6. Work Sequence.
7. Work Guidelines.
8. Coordination of Work.
9. Contractors Use of Premises.
10. Contract Clarification.
11. Alternate Construction Methods.
12. Utility Lines.
13. Warranty.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT (NOT USED)

1.3 SUBMITTALS (NOT USED)

1.4 DEFINITIONS

A. Large Diameter Lines: Water lines 24-inch in diameter and larger. References to large diameter water lines apply to pipe, valves, and appurtenances 24-inches in diameter and larger associated with projects involving water line, plant, and facility- construction.

B. Small Diameter Lines: Water lines 20-inch in diameter and smaller. Unless otherwise noted in the Contract Documents, requirements pertaining to large diameter water lines do not apply to pipe, valves, and appurtenances 20-inches in diameter and smaller.

C. For the purposes of this contract, the terms “Water Main”, “Water Line”, “water line”, “Waterline”, and “waterline” all refer to the same item as the primary component of this work product.

D. Mobilization Area: For Work at facilities, an area, defined on the Contract Drawings, for Contractor staging and storage of construction equipment, tools, products, and spare parts.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

Rehabilitation and/or replacement of pumping equipment and materials for San Jacinto River Authority Woodlands Division Water Well Nos. 25 and 31 along with associated work to water well in-ground facility. It is anticipated that the pumping equipment for both wells will be lowered by 100 feet. Alternate Proposal Items are included for rehabilitation as required.

1.6 CASH ALLOWANCES

A. Contractor's cost for administering services, overhead, profit and other expenses contemplated for the allowance shall be included in the Contract Price and not in the allowance.

B. Whenever costs are more or less than the stipulated allowance, the Contract Price shall be adjusted accordingly via Change Order, see Specification Section 01 26 63 – Change Orders. The amount of the Change Order shall be the difference between actual costs and the amount of the allowance stated in the Bid or Proposal.

1.7 OWNER-FURNISHED PRODUCTS

A. There is an existing 2-inch water tap on-site at both sites. However, this tap is on the existing well piping which is to be replaced. Also, the Owner cannot guarantee sufficient back-pressure can be placed on the well collection line to provide flow from this tap with the piping still in place. The Contractor should plan to have the means to provide water for activities. If drawing from a fire hydrant, the Contractor is to provide and utilize a certified meter and back-flow prevent, with the certifications to be provided to the Owner prior to use. The Contractor is to provide the initial and final readings on the meter to account for water loss.

B. Contractor's Responsibilities:

1. Arrange and pay for product delivery to site.
2. Receive and unload products at site; jointly with Owner's Representative, inspect for completeness or damage.
3. Handle, store, install, and finish products.
4. Repair or replace damaged items.

1.8 DOCUMENT MANAGEMENT SOFTWARE

A. Contractor and the Owner's Representative shall be given the applicable number of Document Management System user names and passwords.

B. Contractor shall use the Owner's internet based document management system to transmit its documents to the Owner's Representative, including but not limited to Requests for Information (RFIs), shop drawing submittals, applications for payment, and letters of correspondence. Refer to Specification Section 01 33 00 – Submittals. The document management software should be able to automatically notify all team members of a submittal upload regardless of the originator, i.e. contractor, Principal Architect/Engineer, Owner's Representative, or Owner. Notification of new uploads should go to all team members regardless if they are the Principal Architect/Engineer or not, i.e. sub-consultants for construction management & inspection, but are not tasked as the Principal Architect/Engineer.

C. A minimum of one (1) and a maximum of three (3) accounts on the document management system will be provided by the Owner. Additional accounts may be requested by the Contractor.

D. Each account will allow one (1) user to access the document management system. Training on the document management system will be provided by the Owner as requested by the Contractor at a mutually agreed upon date and location.

1.9 WORK SEQUENCE

A. Construct Work in phases during the construction period. Coordinate construction schedule and operations with the Owner's Representative. Subcontractors shall coordinate its activities and operations with the Contractor.

B. Construction of this project may require using multiple crews working concurrently in order to complete the project within the specified Contract Time. At no time will multiple crews be allowed to work in consecutive traffic control phases during construction.

C. Due to overall project complexity and numerous active utility interface requirements, submit a sequence of construction of water lines for review by the Owner's Representative. Proposed sequence of construction shall address proposed method and timing of all major construction activities to be undertaken.

D. Data for all facilities and utilities shown were taken from available plans, record drawings, and/or utility maps made available from several sources. Actual field locations of facilities and utilities may vary from that shown on the Drawings. Contractor shall make a complete and independent verification of utility locations prior to submittal of subsequent shop drawings. Unless otherwise approved by the Owner's Representative, work shall not continue at locations where there is a conflict with existing utilities.

E. Construction disturbing traffic shall be conducted during off-peak hours, 9:00 a.m. to 4:00 p.m. weekdays and/or weekends 7:00 p.m. Friday to 4:00 a.m. Monday, dependent upon provisions of Texas Department of Transportation. Exception to these times, if necessary, shall be sought during the permit application process. Continue work in areas using same construction schedule during following, consecutive days and/or weekends until work is completed.

F. All electrical and instrumentation work related to power supply, wiring, conduit and pull boxes will be performed by SJRA staff and will not be part of this contract. Coordination will be required with SJRA staff through the Construction Manager to schedule activities in a proper sequence to allow for these types of items to be performed at the proper times to not impede construction progress.

1.10 WORK GUIDELINES

A. Maintain local driveway access to public schools, residential and commercial properties adjacent to work areas at all times. Provide temporary driveway access in accordance with Specification Sections 01 55 26 – Traffic Control and 01 14 19 – Use of Premises. Coordinate work and schedule with impacted business owners, schools, and residents in conjunction with the Owner, well in advance of commencing the Work in the area(s) of the impacted entities.

B. Contractor shall adhere to each privately owned and operated utility company's construction guidelines when constructing the proposed Work adjacent-to or across each such entities wet or dry utility.

C. Contractor shall coordinate its Work with the respective pipeline companies' at all proposed utility crossings. See appropriate Contract Drawings for additional and /or related information.

D. Obtain right-of-entry agreement(s), insurance, crossing permit(s), and other documentation as required or deemed necessary by each utility or pipeline company or other such entity at no additional cost to the Owner.

E. Contractor shall coordinate its Work schedule with those utility companies who require a representative of their company to be present (onsite) during the construction adjacent-to or across their wet or dry utility.

F. Site restoration at all crossings shall be performed immediately upon completion of the Work. Restoration shall be performed in accordance with all applicable Specification Sections and utility company requirements.

G. Hand dig within one (1) foot of underground service lines (public or private).

H. Contractor shall bear the sole responsibility for damage to existing traffic cables resulting from its construction activities. The Contractor shall be responsible for the repair of damaged traffic cables including the re-cabling of the entire intersection if required, at no additional cost to the Owner.

I. Work associated with hydrostatic testing, disinfection, flushing, or cleaning of the new facility shall not begin without prior approval from the Owner's Representative.

1.11 COORDINATION OF WORK

A. Coordinate activity schedule and extend full cooperation to other Contractors who have responsibilities either concurrent with, proceeding, or following this project's duration along the work site. Ensure availability of access to selected portions of this project area to others and provide appropriate information for planning purposes to other Contractors. No compensation or time extension will be allowed as a result of conflicting construction activities.

B. Flushing of treated (per Section 02673) water used in well rehabilitation activities will be allowed to be conveyed to the adjacent 24-inch storm sewer owned and operated by the Woodlands Joint Powers Agency (WJPA). Contact Mr. Mike Mooney at the WJPA at 832-813-6903 at least 72 hours in advance of conveying water into the storm sewer via the adjacent manhole.

C. As part of this contract, an 18-inch RCP storm sewer is to be installed to connect to an existing manhole on a 24-inch WJPA storm sewer. Contract Mr. Mike Mooney at the WJPA at 832-813-6903 at least 72 hours in advance of work to make the connection to this existing manhole.

D. Comply with coordination requirements outlined in Specification Section 01 14 19 – Use of Premises.

E. Coordinate work with the following construction activities by others:

1. Gracepoint Homes – Contact Mr. Justin Hood at 281-203-6557.
2. Cannongate Golf – Contact Mr. Alan Plagens at 979-255-8454.

F. Dial 811 to contact either Texas 811 or Lone Star 811 One-Call all three (3) One-Call centers in the state of Texas a minimum of seventy-two (72) hours prior to construction within twenty-five (25) feet of a private pipeline.

Contact numbers for such centers are as follows:

1. TESS (Texas) One Call (800) 344-8377
2. Texas One-Call (800) 245-4545
3. Texas (Lone Star) One Call (800) 669-8344

G. Contact San Jacinto River Authority, Woodlands Division a minimum of seventy-two (72) hours (week-day) prior to starting work on-site at 281-367-9511 for marking of any on-site water or wastewater facilities.

H. Contact the Woodlands Joint Powers Agency (Mike Mooney) a minimum of seventy-two (72) hours (week-day) prior to starting work on-site at 832-813-6903 for marking of any on-site utilities and so pre-existing conditions can be noted.

I. All work shall be performed to the lines, grades, elevations, and locations shown on the Drawings.

J. Prevent overstress or damage of any structure and any part or member of it during construction. This applies to new and existing facilities, utilities, and structures affected by construction operations. Contractor shall monitor and record the effect of its construction operations on new and existing facilities, utilities and structures and provide engineered temporary supports and connections as required to assure the safety and stability of the same to prevent overstress of any part

K. Contractor Work performed within all rights-of-way shall be performed in accordance with the respective entities' standards.

1.12 CONTRACTOR USE OF PREMISES

A. Comply with all requirements outlined in Specification Section 01 14 19 – Use of Premises.

1.13 CONTRACT CLARIFICATION

A. Should clarification of the Contract Documents be requested, request clarification before proceeding with Work by submitting a Request for Information (RFI). Such requests shall be preceded by a diligent investigation of the Contract Documents. Include evidence of such investigation(s) in all requests for clarification.

1.14 ALTERNATE CONSTRUCTION METHODS

A. Alternate construction means and methods will be permitted in accordance with applicable Contract Document details and specification at no additional cost to the Owner. Alternate construction means and methods shall provide a substantial benefit to the project and/or the Owner. Contractor accepts full responsibility for all additional costs of geotechnical investigations and other incidental items, including any re-design that may be necessary to permit the alternate construction means and methods.

1.15 UTILITY LINES

A. All utilities represented on the Drawings are shown as an approximate location and are based on the best information available during project design. Contractor shall field-verify the exact location of all utilities prior to commencing construction. The Contractor shall be responsible for any and all damage to these utilities, caused or resulting from their failure to locate, protect and/or maintain these utilities during construction.

1.16 WARRANTY

A. Comply with the warranty requirements stipulated in Contract Document General Conditions and the warranty requirements of the various specification sections of this project manual.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 14 19

USE OF PREMISES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for:
    a. Contractor Responsibilities
    b. Temporary Utilities
    c. Limits of Construction
    d. Storage Sheds and Buildings
    e. Working Times
    f. Site Access Times
    g. Notification to Adjacent Occupants
    h. Safety Requirements
    i. First Aid Equipment
    j. Fire Protection
    k. Security Measures
    l. Protection of Utilities, Pipelines, and Property
    m. Surface Restoration
    n. Traffic Control and Use of Public Rights of Way
    o. Contractor’s Roads and Parking
    p. Coordination with Facility Owner’s Operations
    q. Contractor's Field Office
    r. Principal Architect/Engineer's Field Office
    s. Project Photographs
    t. Special Considerations Related to Adjacent Properties and Facilities
    u. Historical and Archaeological Sites

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Proposing Requirements, Contract Forms, and General Conditions of the Contract.
2. Division 01 – General Requirements.

3. Specification Section 31 21 33 – Trenching, Backfilling, and Compacting for Utilities.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS

A. See Specification Section 01 33 00 – Submittals for the requirements for the mechanics and administration of the submittal process.

B. Contractors Safety Program.

C. All proposed notifications to adjacent occupants.

D. Planning requests for temporary Owner's facility shutdowns.

1.4 CONTRACTOR RESPONSIBITIES

A. Comply with applicable requirements specified in other sections of Project Specifications.

B. Comply with procedures for access to the site and Contractor's use of rights-of-way.

C. Maintain and operate temporary construction facilities and temporary systems to assure continuous service of Owner's and other adjacent existing facilities.

D. Modify and extend temporary systems as Work progress requires.

E. Completely remove materials and equipment when no longer required.

F. Restore existing facilities used for temporary services to original or better condition, or as specified.

G. Prior to installation of material, equipment and/or other work, verify with subcontractors, material or equipment manufacturers, and installers that the substrate or surface to which those materials will attach is acceptable for installation of those materials or equipment. (Substrate is defined as any building or construction surfaces to which materials or equipment are attached to, or required prior to installation i.e., floors, walls, ceilings, soils, utilities, site grading, and backfill etc.).

H. Correct unacceptable substrate until acceptable for installation of equipment or materials.

1.5 TEMPORARY UTILITES

A. Obtaining Temporary Service:

1. Make arrangements with utility service companies for temporary services, unless provided by Owner.

2. Abide by rules and regulations of utility service companies and/or authorities/agencies/entities having jurisdiction.
3. Be responsible for utility service costs and permits until Work is substantially complete. Included services are fuel, power, light, heat, and any other utility services necessary for execution, completion, testing, and initial operation of Work.
4. Be responsible for providing approved metering devices, as necessary, for any temporary utilities.

B. Water:

1. For requirements, refer to 01 11 13, Section 1.5.
2. Provide necessary approved metering devices and backflow preventers.

C. Electricity and Lighting:

1. Provide electrical service required for Work, including testing of Work. Provide power for lighting, operation of equipment, and other use as necessary.
2. For projects on existing sites, electric power service to be provided includes temporary power service or generator(s) to maintain Owner's operations during scheduled shutdown(s). Coordinate all temporary shutdowns with Owner and Owner's Representative(s).
3. Minimum lighting level shall be ten (10) foot-candles for open areas; twenty (20) foot-candles for stairs and shops. Provide minimum of one (1) 300 watt lamp for each 200 square feet of work area.

D. Heat and Ventilation:

1. Provide temporary heat as necessary for protection or completion of Work.
2. Provide temporary heat and ventilation to assure safe working conditions. Maintain enclosed areas at minimum of 50°F.

E. Telephone:

1. Provide emergency telephone service (including call waiting and call forwarding) at Project Site for use by Contractor personnel, Owner, Owner's Representative, and others performing work or furnishing services at the site.

F. Sanitary Facilities:

1. Provide and maintain sanitary facilities for persons on job site. Comply with regulations of State and local departments of health.
2. Enforce use of sanitary facilities by construction personnel at job site. Enclose sanitary facilities. Pit-type toilets will not be permitted. No

discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause nuisance or health problem. Haul sewage and waste off-site and properly dispose of in accordance with all applicable regulations.

3. Locate toilets near Work site, within 500 feet of working activities for line work projects and secluded from view as best as possible. Keep toilets clean and supplied throughout course of Work. Locate toilets a minimum of 100 feet from all water wells.

1.6 LIMITS OF CONSTRUCTION

A. Construction operations and storage areas are limited to Owner's property, permanent easements, temporary construction easements (TCE), and/or the Limits of Construction or Construction Limits as indicated on the Contract Drawings.

B. Unauthorized use of areas, or trespassing on land outside of defined limits, is not permitted.

C. Make arrangements, at no cost to the Owner, for Contractor's temporary use of any private properties which may be needed by Contractor for performance of Work. Contractor and Contractor's surety shall indemnify and hold harmless the Owner and Owner's Representatives against claims or demands arising from use of properties outside the Limits of Construction. Submit notarized copy of any separately negotiated agreement(s) between private property owner(s) and Contractor prior to use of area.

D. Where Limits of Construction are shown on Contract Drawings to extend to a property or Right-of-Way line, keep equipment, materials, and stockpiles a minimum of 5 feet from boundary, or existing fence lines.

E. Where utility alignment is within an esplanade and Limits of Construction are shown to extend to edge of the esplanade, keep equipment, materials, and stockpiles a minimum of 5 feet from back of curb.

F. There are unique terms and conditions associated with the various public and private easements, rights-of-entry, encroachment and crossing documents (collectively, the easement documents) which may be site specific. Contractor shall familiarize itself with all easement Documents. Easement documents are available from the Owner on a case by case basis upon request.

G. The Contractor, at its sole expense, shall be responsible for complying with all terms and conditions of all easement documents and the easement rights described therein for this project.

H. Contractor shall safely, properly, and adequately assume and perform all of the duties, indemnities, responsibilities, and liabilities of the Owner under the easement documents.

I. Contractor, at its cost, shall provide all insurance required by the easement documents. All land included within the tracts covered by the easement documents and easements described herein shall be restored to its original condition prior to Substantial Completion of the construction (including, without limitation, repair or replacement of pavement, concrete, signs, fencing, trees, sidewalks, landscaping, shrubbery, and grass) unless otherwise specified in the Contract Documents.

1.7 STORAGE SHEDS AND BUILDINGS AND STORED MATERIALS

A. Provide adequately ventilated, watertight storage facilities with floor above ground level for protection of materials and equipment susceptible to weather damage.

B. Store materials in neat and orderly manner. Store materials and equipment to permit easy access for identification, inspection, and inventory.

C. Storage of materials not susceptible to weather damage may be on blocks off ground.

D. Storage of all fuels and chemicals shall be in designated areas by Contractor.

E. Refer to Specification Section 01 65 50 – Product Delivery, Storage, and Handling for additional requirements.

F. Fill and grade site for temporary structures to provide positive drainage away from Work area, but not to impact adjacent property owners.

G. Restrict total length of distributed materials along route of construction up to 1,000 linear feet as approved in writing by Owner's Representative.

H. Avoid obstructing drainage ditches or inlets. When obstruction is unavoidable due to requirements of Work, provide grading and temporary drainage structures to maintain unimpeded drainage flow. Failure of the Contractor to maintain proper site drainage shall prohibit it from making a claim against the Owner for monetary or time damages due to drainage impacts.

1.8 WORKING TIMES

A. Construction shall be conducted during working hours as indicated in Specification Section 00 72 00 – General Conditions of the Contract, unless otherwise amended by a supplemental specification or agreement to the General Conditions of the Contract, and approved by Owner.

1.9 SITE ACCESS TIMES

A. Contractor to coordinate all site access, including deliveries, outside of working hours with Owner's Representative. Neither Owner nor Owner's Representatives shall sign for any Contractor deliveries. Refer to Specification Section 01 65 50 – Product Delivery, Storage, and Handling.

B. Contractor shall coordinate with Owner to not interfere with Owner's facility operations.

1.10 NOTIFICATION OF ADJACENT OCCUPANTS

A. Notify individual occupants in areas to be affected by Work of proposed construction activities and schedule using a standardized notification form letter and/or door hanger. Notification shall be made not less than 72 hours or more than 2 weeks prior to performance of work within 200 feet of homes or businesses. Coordinate all notifications with Owner's Representative.

B. Include in notification the names and telephone numbers of two Contractor representatives for resident contact available on 24-hour call. Describe precautions that Contractor will take to protect private property and identify potential inconveniences and disruptions to resident's access and utilities.

C. For Contractor's convenience, Owner's Representative will provide an example notice at the pre-construction meeting. In addition to other requirements of this specification regarding notification to adjacent occupants, Contractor's notice is generally to follow the form and content of the example notice.

D. Submit proposed notification(s) to Owner for approval prior to distribution. Provide notice(s) in languages as appropriate (i.e., double sided notice. Notice on one side shall be written in English and flip side shall be written in Spanish).

1.11 SAFETY REQUIREMENTS

A. Beware of overhead power lines existing in area and in close proximity to project. When 10 feet of clearance between energized overhead power line and construction-related activity cannot be maintained, submit a request to the appropriate utility provider to de-energize or move conflicting overhead power line(s).

B. Submit Contractor's Safety Program in accordance with Specification Section 01 33 00 – Submittals. Include Site Safety and Site Security in accordance with Specification Section 00 72 00 – General Conditions of the Contract. Include documented response to trench safety requirements as specified in Specification Section 00 31 32.10 – Trench Safety Geotechnical Information.

C. Conduct operations in strict accordance with the Contractor's Safety Program, in accordance with applicable Federal, State, and local safety codes and statutes, and with good construction practice. Establish and maintain procedures for safety of all work, personnel, and equipment involved in Project.

D. Observe and comply with Texas Occupational Safety Act (Art. 5182a, V.C.S.) and with all safety and health standards promulgated by Secretary of Labor under Section 107 of Contract Work Hours and Standards Act, published in 29 CFR Part 1926 and adopted by Secretary of Labor as occupational safety and health standards under Williams-Steiger Occupational Safety and Health Act of

1970, and to other legislation enacted for safety and health of Contractor employees. Safety and health standards apply to subcontractors and their employees as well as to Contractor and its employees.

E. Observance of and compliance with regulations is solely and without qualification responsibility of Contractor without reliance or superintendence of or direction by the Owner or Owner's Representative. Immediately advise Owner's Representative of investigation or inspection by Federal Safety and Health Inspectors of Contractor or subcontractor's work or place of work on job site under this Contract, and after investigation or inspection, advise Owner's Representative of results. Submit one copy of accident reports to Owner's Representative within 10 days of occurrence.

F. Protect areas occupied by workmen using best available devices for detection of lethal and combustible gases. Test devices frequently to assure functional capability. Constantly observe infiltration of liquids into Work area for visual or odor evidences of contamination, and immediately take appropriate steps to seal off entry of contaminated liquids into Work area.

G. Implement safety measures, including but not limited to safety personnel, first-aid equipment, ventilating equipment, and other safety equipment, as specified or detailed on the Contract Drawings.

H. Maintain required coordination with Police and Fire Departments during entire period covered by Contract.

I. In safety plan, include project safety analysis. Itemize major tasks and potential safety hazards. Plan to eliminate hazards or protect workers and public from each hazard.

1.12 FIRST AID EQUIPMENT

A. Provide first aid kit throughout construction period. List telephone numbers for hospitals, and ambulance services in each first aid kit.

B. Have at least one person thoroughly trained in first aid and cardiopulmonary resuscitation (CPR) procedures present on site whenever Work is in progress. Contractor to conform to protocols and requirements for training and protection against "blood borne pathogens."

1.13 FIRE PROTECTION

A. Conform to specified fire protection and prevention requirements established by Federal, State, or local governmental agencies and as provided in Contractor's Safety Program.

1.14 SECURITY MEASURES

A. Protect all Work materials, equipment, and property from loss, theft, damage, and vandalism. Perform duty to protect property of the Owner used in

connection with performance of Work.

B. If existing fencing or barriers are breached or removed for purposes of construction, provide and maintain temporary security fencing equal to existing.

1.15 PROTECTION OF UTILITIES, PIPELINES, AND PROPERTY

A. Utilize Utility Coordinating Committee One Call System (telephone number, (713) 223-4567), which must be called 48 hours in advance to locate utilities. Toll free telephone number is 1-800-669-8344, Texas (Lone Star) One Call System.

B. Notify Woodlands Joint Powers Association (WJPA) a minimum of 72 hours in advance of any field activities. Telephone number 281-367-1271.

C. Prevent damage to existing utilities during construction. Utilities shown on Drawings are at approximate locations. Pre-locate, by whatever means may be required (metal detection equipment, probes, excavation, survey), underground utilities before excavating in accordance with the Critical Locations investigation described in Specification Section 31 21 33 – Trenching, Backfilling and Compacting for Utilities. Perform investigative work and repairs required after investigation. Contractor is responsible for damages caused by failure to locate and preserve these underground utilities. Give owners of utilities a minimum of five (5) days' notice before commencing Work in area, for locating utilities during construction and for making adjustments or relocation of utilities when they conflict with proposed Work. Include cost for temporary relocation of utilities necessary to accommodate construction in unit costs for utility construction unless otherwise noted on Drawings. Bypassing of sanitary waste to storm drainage facilities is not allowed. Utility service laterals are not shown on Drawings. Contractor shall anticipate that service lines exist and repair them when damaged due to construction activity. No separate payment will be made for repair work. Include payment in unit prices for work in appropriate sections.

D. Contractor shall adhere to each privately owned and operated utility company's construction guidelines when working adjacent-to or across each such entities wet or dry utility.

E. Prior to abandonment of any utility indicated on the Drawings, make arrangements with Owner's Representative and utility owner to terminate service, remove meters, valves, appurtenances, transformers, and/or poles, as required.

F. Utility Outages and Shutdowns: Provide a notification to the Owner's Representative and private utility companies (when applicable) a minimum of 48 hours, excluding weekends and holidays, in advance of required utility shutdown. Shutdown planning and coordination activities shall commence a minimum of 2-weeks prior to scheduled shutdown. Coordinate all work as

required.

G. Protect and prevent damage to existing crossing, parallel, and adjacent pipelines during construction in accordance with Specification Section 01 11 13 – Work Covered by Contract Documents.

H. When excavating near product pipelines and prior to start of excavation, request that representative of pipeline company come to the construction site(s) to meet representatives of Contractor and Owner's Representative to discuss actual procedures that will be used. Request that pipeline company's representative probe and locate pipelines in at least three locations: one at each side of proposed excavation and one at centerline of proposed Work. Representative of the pipeline company and Owner's Representative must be present to observe activities of Contractor at all times when excavation is being conducted within 15 feet of existing pipelines.

I. Protection of the Work, and Public and Private Property

1. Take precautions, provide programs, and take actions necessary to protect the Work, and public and private property from damage.
2. Do not alter condition of properties adjacent to and along Limits of Construction.
3. Do not use ways, means, methods, techniques, sequences, or procedures that result in damage to adjacent properties or improvements.
4. Restore properties damaged by Contractor outside of designated Limits of Construction at no cost to Owner.
5. Take action to prevent damage, injury, or loss, including, but not limited to, the following:
    a. Store materials, supplies, and equipment in orderly, safe manner that will not interfere with progress of Work or work of others.
    b. Provide suitable storage for materials subject to damage by exposure to weather, theft, breakage, or otherwise.
    c. Place upon Work or any part thereof only safe loads.
    d. Frequently clean up refuse, rubbish, scrap materials, and debris created by construction operations, keeping Project site safe and orderly.
    e. Provide safe barricades and guard rails to protect pedestrian and vehicular traffic around openings, scaffolding, temporary stairs and ramps, excavations, elevated walkways, and other hazardous areas.
6. Assume full responsibility for preservation of public and private property on or adjacent to the Limits of Construction. When direct or indirect damage is done by or on account of any act, omission, neglect, or misconduct in

execution of Work by Contractor, restore to condition equal to or better than that existing before damage was done.

7. Perform daily clean up in affected construction areas in order to restore site to existing or better conditions. Areas should be free of debris, scrap material, dirt, mud, and other items identified by Owner's Representative. Do not leave buildings, roads, streets, or other construction areas unclean. If deemed necessary by the Owner's Representative, Contractor shall employ street sweeping/cleaning equipment to maintain area streets. Include cost of this work in associated items. No separate payment will be made.

J. Barricades and Warning Signals:

1. Where Work is performed on or adjacent to any roadway, right-of-way, or public place, furnish and erect barricades, fences, lights, warning signs, and danger signals, and take other precautionary measures, for protection of persons or property and of the Work.
2. Paint barricades to be visible at night. From sunset to sunrise, furnish and maintain at least one light at each barricade.
3. Erect sufficient barricades to keep vehicles and pedestrians from entering the area under construction.
4. Maintain barricades, signs, lights and provide watchmen until Project is accepted by the Owner or the site has been completely restored to its preconstruction condition.
5. Whenever Work creates encroachment on public roadways, station flagmen to manage traffic flow in accordance with approved traffic control plan. Refer to Specification Section 01 55 26 – Traffic Control.

K. Protection of Existing Structures:

1. Underground Structures:
   a. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, manholes, boxes, chambers, electrical signal and communication conduits, tunnels, and other existing subsurface installations located within or adjacent to limits of Work.
   b. Known underground structures including water, sewer, electric, and telecommunication services are shown on Contract Drawings. This information is not guaranteed to be correct or complete.
   c. Explore ahead of trenching and excavation work and sufficiently uncover obstructing underground structures to determine their location, to prevent damage to them, and to prevent interruption of utility services. Restore underground structures to original conditions at no additional cost if

damaged during construction.

d. Locate and protect private lawn sprinkler systems which may exist within site. Repair or replace damaged systems to condition existing at start of Work, or better.

e. Necessary changes in location of Work may be made by the Owner to avoid unanticipated underground structures.

f. If permanent relocation of underground structures or other subsurface installations is required and not otherwise provided in Contract, the Owner will direct Contractor in writing to perform Work, which is paid for under provisions for changes as described in Specification Section 00 72 00 - General Conditions of the Contract.

2. Surface Structures: Surface structures are defined as existing buildings, structures and other constructed installations above ground surface. Included with structures are their foundations and any extensions below the surface. Surface structures include, but are not limited to buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities visible above ground surface.

3. Existing Condition Survey: Contractor shall survey and adequately document the condition and elevation of existing structures adjacent to the proposed alignment.

4. Protection of Underground and Surface Structures:

   a. Support in place and protect from direct or indirect damage underground and surface structures located within or adjacent to limits of Work.

   b. Prevent overstress or damage to any structure and any part or member of structures during construction. This applies to new and existing facilities, utilities, and structures affected by construction operations. Contractor shall monitor and record the effect of its construction operations on new and existing facilities, utilities, and structures, and shall provide engineered temporary supports and connections as required to assure the safety and stability of the structures and prevent overstress of any part. Employ a registered Professional Engineer licensed in the State of Texas to design temporary supports to assure safety and integrity of structures and facilities.

   c. Install temporary supports carefully and as required by party owning or controlling structure. Before installing structure supports, satisfy Owner's Representative that methods and procedures have been approved by owner of structure.

   d. Avoid moving or changing property of public utilities or private

corporations without prior written consent of responsible official of that service or public utility. Representatives of these utilities reserve the right to enter within limits of this Project for purpose of maintaining their properties, or of making changes or repairs to their property that may be considered necessary by performance of this Contract.

e. Notify owners and/or operators of utilities and pipelines adjacent to the Work of the nature of construction operations and dates when operations will be performed. When construction operations are required in immediate vicinity of existing structures, pipelines, or utilities, give minimum of 5 working days advance notice. Probe and flag location of underground utilities prior to commencement of excavation. Keep flags in place until construction operation reaches and uncovers utility.

f. Assume risks attending presence or proximity of underground and surface structures within or adjacent to Work including but not limited to damage and expense for direct or indirect damage caused by Contractor's Work to structure. Immediately repair damage.

L. Protection of Installed Products:

1. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to final completion of Work.
2. Control traffic to prevent damage to equipment, materials, and surfaces.
3. Provide coverings to protect equipment and materials from damage. Cover projections, wall corners, jambs, sills, and exposed sides of openings in areas used for traffic and passage of materials in subsequent work.

1.16 SURFACE RESTORATION

A. Restore site to the condition which existed before construction in accordance with Specification Section 01 74 23 – Restoration of Site, unless otherwise noted in Contract Documents.

B. For projects not having well defined phases, the total linear footage of project rights-of-way and/or easements that may be disturbed at any given time, shall be limited to no more than fifty (50) percent of the total project linear footage or 1,000 linear feet, whichever is less. Accordingly, disturbed areas shall be restored in accordance with Specification Section 01 74 23 – Restoration of Site prior to proceeding with Work that would exceed the fifty (50) percent total project disturbed length or 1,000 linear feet, whichever is less.

1.17 TRAFFIC CONTROL AND USE OF PUBLIC RIGHTS OF WAY

A. Comply with traffic regulation in accordance with Specification Section 01 55 26 - Traffic Control, and approved traffic control plan(s).

B. Provide barricades and signs in accordance with Section VI of the State of Texas Manual on Uniform Traffic Control Devices.

C. Obtain necessary permits and Owner's approval when the nature of Work requires closing an entire street. Obtaining permits required for street closure are the Contractor's responsibility. Avoid unnecessary inconvenience to abutting property owners. Avoid closing more than two (2) consecutive intersections at one time, except by permission of Owner.

D. Notify Owner's Representative at least 48 hours prior to closing a street or street crossing. It is the Contractor's responsibility to obtain all required permits for street closures in advance.

E. Maintain 10-foot-wide minimum access lane for emergency vehicles, including access to fire hydrants, at all times.

F. Remove surplus materials and debris and open each 500 lineal foot length of roadway for public use when work within that length is complete.

G. Contractor shall provide and install signs indicating entrances to businesses whose normal entry is impaired or detoured as a result of construction. Proposed signs shall be submitted to the Owner's Representative for approval prior to manufacture and installation.

H. Final acceptance of any portion of Work is not based on return of roadway to public use.

I. Avoid obstructing driveways or entrances to private property.

J. Provide temporary access or complete excavation and backfill in one continuous operation to minimize duration of obstruction when excavation is required across drives or entrances.

K. Contractor shall bear the sole responsibility for damage to existing traffic cables resulting from its construction activities. The Contractor shall be responsible for the repair of damaged traffic cables including the re-cabling of the entire intersection if required, at no additional cost to the Owner.

L. Construct and maintain temporary detours, ramps, and/or roads to provide for normal public traffic flow when use of public roads or streets is closed by necessities of Work. Contractor shall obtain all required roadway closure or detour permits in advance of commencing the proposed temporary detour, ramps, and/or roadway Work.

M. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment, large tandem axle trucks or equipment that will damage existing roadway surface. Contractor shall repair or replace damaged roadway not scheduled for removal and/or replacement at no additional cost to the Owner. Repairs or replacement shall be in conformance with the roadway owner's requirements.

N. Provide daily sweeping of hard-surface roadways to remove soils tracked onto public roadways.

1.18 CONTRACTORS ROADS AND PARKING

A. Prevent interference with traffic on existing roads.

B. Construct and maintain temporary access roads and parking areas.

C. Designate temporary parking areas to accommodate Contractor's and Owner's Representative personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by Owner's Representative.

D. Minimize use by construction traffic of existing streets and driveways.

E. Do not allow heavy vehicles or construction equipment in existing parking areas.

F. Do not inhibit the ability of the Owner's personnel to access, operate, and maintain existing facilities during construction.

1.19 COORDINATION WITH FACILITY OWNER'S OPERATIONS

A. Definition: A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, piping, or conduit, has to be temporarily suspended or taken out of service to perform the Work.

B. Work that may interrupt normal operations shall be accomplished at times convenient to, and approved by Owner.

C. Except for necessary shutdowns, perform the Work such that Owner's facilities remain in continuous satisfactory operation during the Project. Schedule and conduct the Work such that the Work does not:

1. Impede Owner's production or processes,
2. Create potential hazards to public health or wellbeing,
3. Create potential hazards to operating equipment and personnel,
4. Reduce the quality of Owner's facilities' product(s) or effluent, or
5. Cause odors or other nuisances.

D. Coordinate shutdowns with Owner. When possible, combine activites into a single shutdown to minimize impacts on Owner's operations and processes.

E. Submit a shutdown plan to the Owner and Principal Architect/Engineer a minimum of 30 days prior to a planned shutdown. Shutdown plan shall consist of the following:

1. For each shutdown, submit an inventory of labor and materials required to perform the shutdown and activities, an estimate of time required to accomplish the complete shutdown including time for Owner to take down and start up existing equipment, systems, or conduits, and written

description of steps required to complete the Work associated with the shutdown.

F. Work that requires shutdown of a ground storage tank at a facility, or any other Work that requires a shutdown of more than 4 hours, shall be performed between 9:00 AM and 4:00 PM.

1. Only one ground storage tank at any facility may be taken out of service at a given time. Subject to the Owner's approval, the Contractor may submit in writing a request to have more than one ground storage tank out of service at a given time, which will be coordinated with the Owner's operations.
2. A ground storage tank may only be taken out of service for a maximum of 2 weeks. All Work within the tank shall be completed within that 2 week duration.

G. After acceptance of shutdown planning submittal and prior to starting the shutdown, provide written notification to Owner of date and time each shutdown is to start. Provide written notification submitted to the Owner's Representative at least 72 hours in advance of each shutdown.

H. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, equipment, spare parts and materials, both temporary and permanent, necessary to successfully complete the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to the associated shutdown. Demonstrate to Owner's satisfaction that Contractor has complied with these requirements before commencing the shutdown.

I. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.

J. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor.

K. Shutdowns of Electrical Systems: Comply with Laws and Regulations, including the National Electric Code. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before shutdown Work is started. Upon completion of shutdown Work, remove the locks and tags and notify Owner that facilities are available for use.

1.20 CONTRACTOR'S FIELD OFFICE (NOT USED)

1.21 PRINCIPAL ARCHITECT/ENGINEER'S FIELD OFFICE (NOT USED)

1.22 PROJECT PHOTOGRAPHS

A. Refer to Specification Section 01 32 36.01 – Project Photographs

1.23 SPECIAL CONSIDERATIONS RELATED TO ADJACENT PROPERTIES AND FACILITIES

A. Contractor shall be responsible for negotiations of any waivers or alternate arrangements required to enable transportation of materials to the site.

B. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.

1. Provide daily sweeping of hard-surface roadways to remove soils tracked onto roadway.

1.24 HISTORICAL AND ARCHAEOLOGICAL SITES

A. If, during the course of construction, evidence of deposits of historical or archeological interest are found, the Contractor shall cease operations affecting the find and shall notify Owner.

1. No further disturbance of the deposits shall ensue until the Contractor has been notified by Owner that Contractor may proceed.

2. Owner will issue a notice to proceed after appropriate authorities have surveyed the find and made a determination to Owner.

3. Compensation to the Contractor, if any, for lost time or changes in construction resulting from the find shall be determined in accordance with changed or extra work provisions of the Contract Documents.

B. Refer to Specification Section 00 72 00 – General Conditions of the Contract including paragraph 4.2.4.

1.25 WARRANTY (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 MAINTENANCE

A. Maintain temporary facilities in a clean, neat, and orderly manner including maintenance of all-weather surface driveway and parking areas, buildings and furnishings, and equipment or materials furnished and supplied as part of any temporary field office or storage yard for duration of Contract.

B. Provide regular janitorial services for any temporary field office for duration of Contract. Janitorial services consist of twice weekly sweeping and mopping of floors and trash removal, weekly cleaning of restrooms, and weekly dusting of furniture and equipment.

C. Provide soap and water, paper towels, toilet paper, cleansers, and other

necessary consumables to properly maintain any temporary field office and all temporary toilet facilities.

D. At this office, maintain complete field file of Shop Drawings, posted Drawings and Specifications, and other files of field operations including provisions for maintaining "As Built Drawings."

E. Immediately repair damage, leaks, or defective service.

F. Remove any field office provided under this contract from site upon acceptance of the entire work by the Owner.

3.2 OWNER TRAINING (NOT USED)

END OF SECTION

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Authority
2. Unit Quantities Specified
3. Measurement
4. Payment Plus Conditions
5. Nonconformance Assessment
6. Nonpayment for Rejected Products

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Measurement:

1. Measurement by Weight: Reinforcing steel, rolled or formed steel or other metal shapes are measured by CRSI or AISC Manual of Steel Construction weights. Welded assemblies are measured by CRSI or AISC Manual of Steel Construction or scale weights.
2. Measurement by Volume:
   a. Stockpiles: Measured by cubic dimension using mean length, width, and height or thickness.
   b. Excavation and Embankment Materials: Measured by cubic dimension using average end area method.
3. Measurement by Area: Measured by square dimension using mean length and width or radius.
4. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
5. Stipulated Price Measurement: By unit designated in Agreement.
6. Other: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of Work.
7. Measurement by Each: Measured by each instance or item provided.

8. Measurement by Lump Sum: Measure includes all associated work.

B. Payment:

1. Payment Includes: Full compensation for required supervision, labor, products, tools, equipment, plant, transportation, services, and incidentals; and erection, application or installation of an item of Work; and Contractor's overhead and profit.
2. Total compensation for required Unit Price Work shall be included in Unit Price provided in Proposal. Claims for payment as Unit Price Work, but not specifically covered in list of unit prices contained in Proposal, will not be accepted.
3. Interim payments for stored materials will be made only for materials to be incorporated under items covered in unit prices, unless disallowed in Supplementary Conditions.
4. Progress payments will be based on Owner's Representative's observations and evaluations of quantities incorporated in Work multiplied by unit price.
5. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities determined by Owner's Representative multiplied by unit price for Work which is incorporated in or made necessary by the Work.

1.3 SUBMITTALS (NOT USED)

1.4 AUTHORITY

A. Measurement methods delineated in Specification sections are intended to complement criteria of this section. In event of conflict, the order of governance is: General Conditions, Individual Specifications, 01 22 00 – Unit Prices.

B. Owner's Representative will take measurements and compute quantities accordingly.

C. Assist by providing necessary equipment, workers, and survey personnel.

1.5 UNIT QUANTITIES SPECIFIED

A. Quantity and measurement estimates stated in Agreement are for contract purposes only. Quantities and measurements supplied or placed in Work and verified by Owner's' Representative (GCs 11.6.2) shall determine payment as stated in Specifications Section 00 72 00 - General Conditions of the Contract.

B. When actual Work requires greater or lesser quantities than those quantities indicated in Proposal, provide required quantities at unit prices contracted as stated in Specifications Section 00 72 00 – General Conditions of the Contract.

1.6 NONCONFORMANCE ASSESSMENT

A. Remove and replace Work, or portions of Work, not conforming to Contract Documents.

B. When not practical to remove and replace Work, Owner's Representative will direct one of the following remedies:

1. Nonconforming Work will remain as is, but Unit Price will be adjusted lower at discretion of Owner's Representative.
2. Nonconforming Work will be modified as authorized by Owner's Representative, and Unit Price will be adjusted lower at discretion of Owner's Representative, when modified Work is deemed less suitable than specified.

C. Specification sections may modify above remedies or may identify a specific formula or percentage price reduction.

D. Authority of Owner's Representative to assess nonconforming work and identify payment adjustment is final.

1.7 NONPAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for the following:

1. Products wasted or disposed of in unacceptable manner.
2. Products determined as nonconforming before or after placement.
3. Products not completely unloaded from transporting vehicle.
4. Products placed beyond lines and levels of required Work.
5. Products remaining on hand after completion of Work, unless specified otherwise.
6. Loading, hauling, and disposing of rejected products.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 25 13

PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. The procedure for requesting the approval of substitution of a product that is not equivalent to a product which is specified by descriptive or performance criteria or defined by reference to one or more of the following:

   a. Name of manufacturer.

   b. Name of vendor.

   c. Trade name.

   d. Catalog number.

2. Substitutions are not "or-equals".

3. This Specification Section does not address substitutions for major equipment.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.

2. Division 01 – General Requirements.

C. Request for Substitution – General:

1. Base all bids on materials, equipment, and procedures specified.

2. Certain types of equipment and kinds of material are described in specifications by means of references to names of manufacturers and vendors, trade names, or catalog numbers.

   a. When this method of specifying is used, it is not intended to exclude from consideration other products bearing other manufacturer's or vendor's names, trade names, or catalog numbers, provided said products are "or-equals," as determined by Owner’s Representative.

3. Other types of equipment and kinds of material may be acceptable substitutions under the following conditions:

   a. Or-equals are unavailable due to strike, discontinued production of products meeting specified requirements, or other factors beyond control of Contractor; or,

b. Contractor proposes a cost and/or time reduction incentive to the Owner.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE

A. In making request for substitution or in using an approved product, Contractor represents Contractor:

1. Has investigated proposed product, and has determined that it is adequate or superior in all respects to that specified, and that it will perform function for which it is intended.
2. Will provide same guarantee for substitute item as for product specified.
3. Will coordinate installation of accepted substitution into Work, to include building modifications if necessary, making such changes as may be required for Work to be complete in all respects.
4. Waives all claims for additional costs related to substitution which subsequently arise.

1.5 DEFINITIONS

A. Product: Manufactured material or equipment.

1.6 PROCEDURE FOR REQUESTING SUBSTITUTION

A. Substitution shall be considered only:

1. After award of Contract.
2. Under the conditions stated herein.

B. Written request through Contractor only.

C. Transmittal Mechanics:

1. Follow the transmittal mechanics prescribed for Shop Drawings in Specification Section 01 33 00 – Submittals.
   a. Product substitution will be treated in a manner similar to "deviations," as described in Specification Section 01 33 00 – Submittals.
   b. List the letter describing the deviation and justifications on the transmittal form in the space provided under the column with the heading DESCRIPTION.

1) Include in the transmittal letter, either directly or as a clearly marked attachment, the items listed in the following paragraph below.

D. Transmittal Contents:

1. Product identification:
   a. Manufacturer's name.
   b. Telephone number and representative contact name.
   c. Specification Section or Drawing reference of originally specified product, including discrete name or tag number assigned to original product in the Contract Documents.
2. Manufacturer's literature clearly marked to show compliance of proposed product with Contract Documents.
3. Itemized comparison of original and proposed product addressing product characteristics including but not necessarily limited to:
   a. Size.
   b. Composition or materials of construction.
   c. Weight.
   d. Electrical or mechanical requirements.
4. Product experience:
   a. Location of past projects utilizing product.
   b. Name and telephone number of persons associated with referenced projects knowledgeable concerning proposed product.
   c. Available field data and reports associated with proposed product.
5. Data relating to changes in construction schedule.
6. Data relating to changes in cost.
7. Samples:
   a. At request of Owner’s Representative.
   b. Full size if requested by Owner’s Representative.
   c. Held until substantial completion.
   d. Owner’s Representative not responsible for loss or damage to samples.

1.7 APPROVAL OR REJECTION

A. Written approval or rejection of substitution given by the Owner’s Representative, Principal Architect/Engineer, and the Owner.

B. Owner's Representative reserves the right to require proposed product to comply with color and pattern of specified product if necessary to secure design intent.

C. In the event the substitution is approved, the resulting cost and/or time reduction will be documented by Change Order in accordance with the General Conditions.

D. Substitution will be rejected if:

1. Submittal is not through the Contractor with his stamp of approval.
2. Request is not made in accordance with this Specification Section.
3. In Owner's Representative opinion, acceptance will require substantial revision of the original design.
4. In the Owner's Representative opinion, substitution will not perform adequately the function consistent with the design intent.

E. Contractor shall reimburse Owner for the cost of the Owner's Representative evaluation whether or not substitution is approved.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 26 63

CHANGE ORDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

Procedures for processing Change Orders, including:

1. Quality Assurance.
2. Responsible Individual.
3. Documentation of Change in Contract Price and Contract Time.
4. Change Procedures.
5. Proposals and Contract Modifications.
6. Work Change Directive.
7. Change Order.
8. Execution of Change Documentation.
9. Correlation of Contractor Submittals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT (NOT USED)

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. Equipment Rental Rates: equipmentwatch.com. Rental Rate is defined as full unadjusted base rental rate for appropriate item of construction equipment.

1.5 RESPONSIBLE INDIVIDUAL

A. Provide letter to the Owner's Representative indicating name, title, address and contact information of individual authorized to execute change documents and who is responsible for informing others in Contractor's employ and Subcontractors of changes to the Work. Information should be provided at the Preconstruction Conference but, no later than 10 calendar days following the Preconstruction Conference.

1.6 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Maintain detailed records of changes in Work. Provide full information required for identification and evaluation of proposed changes, and substantiate costs of changes in Work.

B. Document each proposal for change in cost or time with sufficient data to allow evaluation of proposal. Provide additional information upon request of the Owner or the Owner's Representative.

C. Proposals shall include the following minimum information:

1. Quantities of items in original Proposal with additions, reductions, deletions, and substitutions.
2. Quantities and cost of items in original schedule of values with additions, reductions, deletions, and substitutions.
3. Provide unit prices for items not included in original Proposal with supporting information when absent from original Proposal Work.
4. Justification for changes in Contract Time.
5. Additional data upon request.

D. For changes in Work performed on a time-and-materials basis, provide the following additional information:

1. Quantities and description of products and equipment.
2. Taxes, insurance and bonds.
3. Overhead and profit as noted in Document 00 72 00 - General Conditions, Article 11.5.
4. Dates, times, and by whom work was performed.
5. Time records and certified copies of applicable payrolls.
6. Invoices, receipts for products, rented equipment, and subcontracts, similarly documented.

E. For changes in Work performed on a time-and-materials basis, payment for rental equipment will be as follows:

1. Actual invoice cost for duration required to complete extra work without markup for overhead and profit. When extra work comprises only a portion of rental invoice where equipment would otherwise be on site, compute hourly equipment rate by dividing the actual monthly invoice by 176. (One day equals 8 hours and 1 week equals 40 hours.)
2. Do not exceed estimated operating costs given on equipmentwatch.com website for items of equipment. Overhead and profit will be allowed on operating cost.

F. For changes in Work performed on a time-and-materials basis using Contractor-owned equipment, use equipmentwatch.com rates as follows:

1. Contractor-owned equipment will be paid at Rental Rate for duration of time required to complete extra work without markup for overhead and profit. Utilize lowest cost combination of hourly, daily, weekly, or monthly rates. Use 150 percent of Rental Rate for double shifts (one extra shift per day) and 200 percent of Rental Rate for more than two shifts per day. Standby rates shall be 50 percent of appropriate Rental Rate shown on equipmentwatch.com website. No other rate adjustments apply.
2. Do not exceed estimated operating costs given on equipmentwatch.com. Overhead and profit will be allowed on operating cost. Operating costs will not be allowed for equipment on standby.

1.7 CHANGE PROCEDURES

A. Changes to Contract Price or Contract Time can only be made by issuance of Change Order. Issuance of Work Change Directive will be formalized into a Change Order. Changes will be in accordance with requirements of the General Conditions.

B. The Owner's Representative will advise of minor changes in Work not involving an adjustment to Contract Price or Contract Time as authorized by the General Conditions by issuing supplemental instructions.

C. Request clarification of Drawings, Specifications, Contract Documents, or other information by using Request for Information. Response by the Owner's Representative to Requests for Information does not authorize Contractor to perform tasks outside scope of Work. Changes must be authorized as described in this section.

1.8 PROPOSALS AND CONTRACT MODIFICATIONS

A. The Owner or the Owner's Representative may issue a Request for Proposal (RFP), which includes detailed description of proposed change with supplementary or revised Drawings and Specifications. The Owner or the Owner's Representative may also request a proposal in response to a Request for Information. Prepare and submit proposal within 7 days or as specified in the request.

B. Submit request for Contractor changes to Owner's Representative describing proposed change and its full effect on Work, with a statement describing reason for change and effect on Contract Price and Contract Time including full documentation.

C. The Owner may use the Principal Architect/Engineer to review Change Orders.

1.9 WORK CHANGE DIRECTIVE

A. The Owner may issue a signed Work Change Directive instructing Contractor to proceed with a change in Work. Work Change Directive will subsequently be incorporated in Change Order.

B. Document will describe changes in Work and designate method of determining change in Contract Price or Contract Time.

C. Proceed promptly to execute changes in Work in accordance with Work Change Directive.

1.10 CHANGE ORDER

A. Stipulated Price Change Order

1. Stipulated Price Change Order will be based on accepted proposal.

B. Unit Price Change Order

1. Where Unit Prices for affected items of Work are included in Proposal, unit price Change Order will be based on unit prices, subject to the General Conditions.
2. Where unit prices of Work are not pre-determined in Proposal, Work Change Directive or accepted proposal will specify unit prices to be used.

C. Time-and-Material Change Order

1. Provide itemized account and supporting data after completion of change, within time limits indicated for claims in the General Conditions.
2. The Owner will determine change allowable in Contract Price and Contract Time as provided in the General Conditions.
3. Maintain detailed records of work done on time-and-material basis as specified in paragraph 1.4, Documentation of Change in Contract Price and Contract Time.
4. Provide full information required for evaluation of changes and substantiate costs for changes in Work.

1.11 EXECUTION OF CHANGE DOCUMENTATION

A. The Owner or the Owner's Representative will issue Change Orders, Work Change Directives, or accepted proposal for signatures of parties as described in the General Conditions.

1.12 CORRELATION OF CONTRACTOR SUBMITTALS

A. For Stipulated Price Contracts, promptly revise Schedule of Values and Application for Payment forms to record authorized Change Orders as separate line item.

B. For Unit Price Contracts, next monthly estimate of Work after acceptance of a Change Order will be revised to include new items not previously included and appropriate unit rates.

C. Promptly revise progress schedules to reflect change in Contract Time, and to adjust time for other items of work affected by change, and resubmit for review.

D. Promptly enter changes to on-site and record copies of Drawings, Specifications, or Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 29 73

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Measurement and Payment
2. Definition
3. Preparation
4. Submittal

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS

A. Submit Schedule of Values in accordance with requirements of Section 01 33 00 – Submittals. Submit at least 10 days prior to submitting first application for progress payment. Submit via SharePoint.

B. Revise Schedule of Values and resubmit for items affected by contract modifications, Change Orders, and Work Change Directives. After changes are reviewed without exception by Authority's Principal Architect/Engineer, make submittal at least 10 days prior to submitting next application for progress payment.

1.4 DEFINITIONS

A. Schedule of Values: Is a schedule, prepared and maintained by the Contractor, allocating portions of the Contract Amount to various portions of the Work, including a tabulation of all of the costs of the various Subcontracts and materials which in the aggregate make up the Cost of the Work. The Schedule of Values shall be subject to Owner's approval and, after such approval, be used as the basis for reviewing the Contractor's Application For Payment.

B. Break down costs to list major products or operations for each line item which has an installed value of more than $5000.

1.5 PREPARATION

A. For stipulated price contracts, subdivide Schedule of Values into logical portions of Work, such as major work items or work in contiguous geographic areas.

B. Schedule and Schedule of Values shall be developed together. At a minimum, the Schedule of Values shall be broken out by trade and split between materials and labor as approved by the Owner. Such Prices will include overhead and profit applicable to each item of work.

C. For lump sum equipment items where submittal of operation/maintenance data and testing are required, include separate item for equipment operation and maintenance data submittal valued at 5 percent of lump sum amount for each equipment item and separate item for testing and adjusting valued at 5 percent of lump sum amount for each equipment item.

D. Round off figures for each listed item to nearest $100 except for value of one item, when necessary, to make total of items in Schedule of Values equal Contract Price for stipulated price contracts or lump sum amount in Schedule of Unit Price Work.

E. Submit Schedule of Values in approved electronic spreadsheet, formatted to print on 11” x 17” paper, to the Owner’s Document Management System.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Specific requirements for the preparation, submittal, updating, status reporting and management of the construction Progress Schedule.

B. Provide Construction Schedules for Work included in Contract in accordance with requirements in this Section. Create Construction Schedule using Critical Path Method (CPM) computer software capable of mathematical analysis of Precedence Diagramming Method (PDM) plans. Provide printed activity listings and bar charts in formats described in this Section.

C. Combine activity listings and bar charts with narrative report to form Construction Schedule submittal for Owner and the Owner's Representatives.

D. Related Specification Sections include, but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms and Conditions of the Contract.

2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost of construction scheduling in overhead cost for this project.

1.3 SCHEDULING STAFF

A. Employ or retain services of individual experienced in critical path scheduling for duration of Contract. Individual shall cooperate with Owner's Representative and shall update schedule (Progress Schedule) monthly as required by the Contract's General Conditions, to indicate current status of Work.

1.4 QUALITY ASSURANCE

A. The person preparing and revising the construction Progress Schedule shall be experienced in the preparation of schedules of similar complexity.

B. Within five (5) days from award of the Contract, Contractor shall submit to Owner's Representative the name of the person responsible for the preparation, maintenance, updating and revision of all schedules.

1. Qualifications necessary:

a. At least five (5) years verifiable experience in the preparation and updating of complex construction schedules for projects of similar type, size and complexity.

b. Proficient in the use of Microsoft© Project® 2007.

1.5 DEFINITIONS

A. The following definitions shall apply to this Specification Section:

1. BASELINE SCHEDULE: The initial as-bid, detailed, cost and resource loaded Progress Schedule prepared by the Contractor to define its plan for constructing the Project as required by the Contract Documents, and accepted by the Owner or Owner's Representative as meeting the requirements of the Contract Documents for specified constraints, sequences, milestones and completion dates.
2. PROGRESS SCHEDULE: The initially accepted Baseline Schedule, or subsequently approved Revised Baseline Schedules, updated each month to reflect actual start and finish dates of schedule activities and all time impact events whether caused by Contractor or Owner or factors beyond the control of either party.
3. REVISED BASELINE SCHEDULE: The initially accepted Baseline Schedule revised to reflect only approved changes.
4. WORKING SCHEDULE: A schedule developed from the Progress Schedule, utilizing scheduling software features not allowed for Baseline and Progress Schedules at the Contractor's sole discretion, to indicate the Contractor's plan for executing the Work, and providing for schedule recovery when approved time extensions are not sufficient to provide for timely completion due to Contractor inefficiencies beyond the control of the Owner or outside the risks accepted by the Owner.

1.6 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Scheduler qualifications.
3. Baseline Schedule: Submitted within 10} days after Effective Date of Agreement.
4. Monthly Progress Schedules.
5. Revised Baseline Schedules.
6. Working Schedules.
7. Look-Ahead Schedules.

1.7 GENERAL REQUIREMENTS

A. Contractor shall prepare and submit Baseline and Progress Schedules and updates and revisions to them as specified herein.

1. All scheduling to be performed in Microsoft© Project® 2007.

2. The Baseline and Progress Schedules shall be a calendar day-based and cost-loaded Critical Path Method (CPM) network diagram with supporting data.

B. Disallowed Scheduling Software Features:

1. The following specific features are not allowed to be applied in the Baseline and Progress Schedules:

   a. Resource leveling.

   b. Activity or event constraints, other than those specified by the Contract Documents.

   c. Leads and lags:

      1) Create specific activities with specific durations in-lieu-of leads and lags.

      2) Durations shall have positive values.

   d. Default progress data:

      1) Start and finish dates shall not be automatically updated.

      2) Update with actual start and finish dates documented from field reports.

      3) Work activities shall be updated by actual Work progression, not cash flow driven.

      4) Updating of activity percent complete and remaining duration shall be independent functions, not one parameter calculated from the other.

      5) Out-of-sequence progress shall be accounted for through retained logic, not a default option of progress override.

   e. Multiple calendars.

2. Any float suppression techniques or other software features that corrupts the pure mathematical model calculating the critical path.

   a. The following CPM schedule outputs will be rejected without further review:

      1) Schedules indicating the start of the critical path at a date point or activity beyond the date of Notice to Proceed, or schedules indicating a discontinuous critical path from Notice to Proceed to Contract completion.

      2) Schedules defining critical activities as those on a path or paths having some minimum value of float.

      3) Schedules with multiple critical paths.

      4) Schedules indicating a completion date beyond the contractual completion date.

3. Contractor, at Contractor's sole discretion, may employ the disallowed scheduling software features for Contractor's exclusive use in preparing a Working Schedule.

C. Float Time:

1. Neither the Owner nor the Contractor owns the float; the project owns the float.
2. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date.

D. By preparing and submitting the Baseline Schedule, the Contractor represents that it can and intends to execute the Work and portions thereof within the specified times and constraints and that its bid covers the costs associated with the execution of the Work in accordance with the Construction Schedule.

E. Contractor shall provide an electronic copy on CD media for the Baseline Schedule and Progress Schedule and all monthly updates of both to accompany hard copies of the schedules and tabular reports.

1. Electronic submittal shall be in a format compatible with Microsoft© Project® 2007.
2. Contractor shall provide with the schedules, a procedural outline of the system shut-downs and proposed tie-ins, and the Owner's O&M staff, which shall be subject to approval of the Owner.

1.8 SUBMITTAL PACKAGES

A. Baseline Schedule:

1. CPM time-scaled network diagram:
   a. Three (3) prints of each sheet.
   b. Minimum sheet size: 11 IN x 17 IN.
   c. Provide electronic format (CD-ROM).
2. Supporting data:
   a. Three (3) sets of a list of project activities including the following:
      1) Holidays that will be observed during construction.
      2) Number of planned working days and shifts per week.

B. Monthly updates that include the following:

1. Narrative Schedule Report.
2. Revised Baseline Schedule as appropriate.
   a. Update to reflect approved Change Orders occurring since the prior update.

b. If no new approved Change Orders since prior update, provide a narrative report indicating such, and acknowledging the pertinence of the previously approved Baseline Schedule.

3. Updated Progress Schedule.
4. Explanation of changes in logic, duration of activities.
5. Upload electronic version (pdf) to SharePoint.

C. Look-Ahead Rolling Schedule:

1. A four-week rolling schedule shall be provided by the Contractor at each progress meeting.
   a. The schedule shall provide an accurate representation of the work performed the previous week and work planned for the current week and subsequent two (2) weeks.
2. The schedule shall be provided in a tabular format with bars representing work duration.
   a. The schedule shall refer to activity ID numbers on the Baseline and Progress Schedules.
   b. Activities that are on the critical path and activities that are behind schedule shall be noted by color, highlight, or underscore.
3. Derived from the Working Schedule, if applicable.

D. Narrative Schedule Report:

1. Schedule reports for Initial Baseline and Revised Baseline Schedules shall include the following minimum data for each activity:
   a. Preceding and succeeding activities.
   b. Activity description and number.
   c. Durations of activities:
      1) Original durations.
      2) Remaining durations.
   d. Earliest start date (by calendar date).
   e. Earliest finish date (by calendar date).
   f. Actual start date (by calendar date).
   g. Actual finish date (by calendar date).
   h. Latest start date (by calendar date).
   i. Latest finish date (by calendar date).
   j. Float.
   k. Percentage of activity completed.

l. Activity constraints specified by the Contract Documents.

m. Type of Tabulation (Initial or Updated).

n. Project Duration.

o. Project Contractual Completion Date.

p. The date of commencement of the Work as stated in the Notice to Proceed.

q. If an updated (revised) schedule, cite the new project completion date and project status and date of revision.

2. Shall be organized in the following sequence with all applicable documents included:

a. Contractor's transmittal letter.

b. Work completed during the period.

c. Identification of unusual conditions or restrictions regarding labor, equipment or material.

d. Description of the current critical path.

e. Changes to the critical path and scheduled completion date since the last schedule submittal.

f. Description of problem areas.

g. Current and anticipated delays:

1) Cause of delay.

2) Impact of delay on other activities, milestones and completion dates.

3) Corrective action and schedule adjustments to correct the delay.

h. Pending items and status thereof:

1) Permits.

2) Change orders.

3) Time adjustments.

4) Non-compliance notices.

i. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

1.9 START-UP, DEMONSTRATION, TRAINING, AND FINAL COMPLETION

A. The Baseline Schedule must include broad-based activities for start-up, operator training, and final completion.

1. The Baseline Schedule may not necessarily contain sufficient detail on all activities listed in Specification Section 01 75 00 – Facility Start Up for start-up and demonstration.

2. At least 90 days prior to any activities, submit a detailed schedule in conformance with the requirements of Specification Section 01 75 00 – Facility Start Up:
    a. Identify task for the substantial completion notification.
    b. Pre-demonstration period:
        1) Identify equipment start-up for all major equipment.
        2) Identify all operator trainings required by individual Specification Sections.
        3) Complete submission of all required submittals.
    c. Demonstration period: Identify the demonstration period for each project classified system.

1.10 SCHEDULING CONFERENCE

A. Contractor shall schedule and Owner's Representative will conduct a scheduling conference with Contractor's project manager and construction scheduler.
    1. Conference must take place within 10 business days after the Preconstruction Conference.
    2. Owner's Representative will review the requirements of this Specification Section and other specified scheduling and sequencing requirements with Contractor.
    3. Baseline Construction Schedule:
        a. Provide five (5) copies of a Baseline Schedule in the form of an arrow or precedence diagram covering the following project phases and activities:
            1) Schedule of Submittals of Shop Drawings and schedule dates for fabrication and delivery of key and long lead time items.
            2) Contractor's submittal information shall show intended submittal dates and shall include, as a minimum, the maximum allowable review period.
            3) The information shall provide sufficient durations for reasonable administration of re-submittals, fabrication and transportation to produce realistic delivery dates for those procurement items.
    4. Owner's Representative shall review the schedule and provide comments.
    5. Provide approval of the schedule or request a meeting to review the schedule with Contractor within seven (7) days of receipt of the schedule.
    6. If requested, Contractor shall participate in a review and evaluation of the schedule with Owner's Representative.
    7. Any revisions necessary as a result of this review shall be resubmitted for review by Owner's Representative within five (5) business days.

B. Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations.
   1. Contractor shall be prepared to discuss the proposed work plan and schedule methodology that comply with the Contract requirements.
   2. If Contractor proposes deviations to specified construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts.
   3. Contractor shall be prepared to discuss the proposal.

C. Contractor shall provide the Preliminary Schedule of Values for the work to be performed.
   1. This document must match the total quantities and costs associated with the scheduled tasks.

D. Owner's Representative will review the logic diagram, WBS coding structure, and activity identification system, and provide required Baseline Schedule changes to Contractor for implementation within seven (7) days following the Conference.

E. Scheduling Conference (are required on a weekly basis until agreement to the Baseline Schedule is reached.
   1. Contractor to provide copies of the revised schedule.
   2. Contractor to address specific comments from the previous meeting.
   3. Contractor to revise the narrative as required.

1.11 BASELINE SCHEDULE

A. Schedule shall include, but not be limited to, activities that show the following that are applicable to the project:
   1. Project characteristics, salient features, or interfaces, including those with outside entities that could affect time of completion.
   2. Project start date, scheduled completion date and other milestones.
   3. Work performed by Contractor, subcontractors and suppliers.
   4. Submittal development, delivery, review and approval, including those from Contractor, subcontractors and suppliers.
   5. Procurement, delivery, installation and testing of materials, plants and equipment.
   6. Testing and settlement periods.
   7. Utility notification and relocation.
   8. Erection and removal of falsework and shoring.
   9. Finish work and final cleanup.
   10. Project float as the predecessor activity to the scheduled completion date.

B. Schedule shall have not less than 15 activities, unless otherwise authorized by the Owner's Representative.

1. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.
2. Schedule activities shall include the following:
    a. A clear and legible description.
    b. Start and finish dates.
    c. A duration of not less than one (1) working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Owner's Representative.
    d. At least one (1) predecessor and one (1) successor activity, except for project start and finish milestones.
    e. Required constraints: Only contractually required constraints may be inserted into the Baseline Schedule.
    f. Codes for responsibility, stage, work shifts, location and contract pay item numbers.

C. Working durations shall be planned to incorporate the effects of normal weather impacts. See General Conditions Article 12.2 for the "Baseline Rain Day Determination".

1.12 PROGRESS SCHEDULE

A. Develop Progress Schedule based on approved Baseline and Revised Baseline Schedules.

1. All restrictions on use of constraints, leads and lags, resource leveling, etc., shall also apply to Progress Schedules.

B. The Progress Schedule will be updated once per month for monitoring progress.

1. Contractor may submit one (1) additional update per month for its own convenience.

C. Indicate progress by making entries on the most recently accepted version of the network diagram and supporting data to show:

1. Activities completed.
2. Activities started.
3. Remaining duration for each activity started but not yet completed.
4. Percent complete based on value of work in place and value of equipment or material delivered and properly stored.
5. Status of activity due to be completed by the next scheduled progress meeting.

D. Computerized Progress Schedule and percent completion of Work shall be used to verify Contractor's payment requests.

1. Progress payments will not be processed by the Owner's Representative unless the updated Progress Schedule has been submitted concurrently with a pay request and found acceptable by the Owner's Representative.

1.13 REVISIONS TO PROGRESS SCHEDULE

A. Contractor shall submit data for a revised Progress Schedule within five (5) days of the occurrence of any of the following:

1. When contractor-caused delay in completion of any activity or group of activities indicates an overrun of the Contract Time or Control Dates by 30 working days or 10 percent of the remaining duration, whichever is less.
2. When delays in submittals, deliveries, or work stoppages are encountered making necessary the replanning or rescheduling of the Work.
3. When the schedule does not represent the actual progress of the Work.
4. When a change order significantly affects the contract completion date.

B. The revised Progress Schedule shall be the basis of a Working Schedule showing:

1. How Contractor intends to return to schedule.
2. How Contractor intends to avoid falling behind schedule on future activities.

C. Show changes on the network diagram and supporting data including:

1. New activities and their duration.
2. Modifications to existing activities.

D. Provide written narrative report as needed to define:

1. Problem areas, anticipated delays, and impact on the current schedule.
2. Corrective action recommended, and its effect.
3. Major changes in scope.
4. Revised projections of progress and completion.

E. Except as provided in the following subparagraphs 1 and 2, the cost of revisions to the Progress Schedule resulting from changes in the Work shall be included in the cost for the change in the Work, and shall be based on the complexity of the revision or Change Order, man-hours expended in analyzing the change, and the total cost of the change.

1. The cost of revision to the Construction Schedule not resulting from authorized changes in the Work shall be the responsibility of the Contractor.
2. The cost of revision to the Construction Schedule for the Contractor's convenience shall be the responsibility of the Contractor.

F. The revised network diagram and supporting data for the Progress Schedule shall be submitted to the Owner's Representative upon completion of the revisions, but not later than the next progress meeting.

G. Revisions to the Progress Schedule for the Contractor's convenience:

1. Must be approved by the Owner's Representative before Contractor changes the sequence of Work.

1.14 TIME IMPACT ANALYSIS (TIA)

A. The accepted initial Baseline Schedule or subsequently accepted Revised Baseline Schedule shall be used for TIA.

B. Contractor shall submit a written TIA to the Owner's Representative with each request for adjustment of Contract Time, or when Contractor or Owner's Representative consider that an approved or anticipated change may impact the critical path or contract progress.

1. The TIA must be attached to any change order prior to approval of any change to time or cost.

C. The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate.

1. The analysis shall use the Baseline or Revised Baseline Schedule (accepted Baseline Schedule) that has a data date closest to and prior to the event.

2. If the Owner's Representative determines that the accepted Baseline Schedule used does not appropriately represent the conditions prior to the event, the accepted Baseline Schedule shall be updated to the day before the event being analyzed.

3. The TIA shall include an impact schedule developed from incorporating the event into the accepted Baseline Schedule by adding or deleting activities, or by changing durations or logic of existing activities as appropriate to the nature of the change event.

4. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted Baseline Schedule, the difference between scheduled completion dates of the two (2) schedules shall be equal to the adjustment of Contract Time.

D. Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Owner's Representative.

1. Contractor shall allow the Owner's Representative two (2) weeks after receipt to approve or reject the submitted TIA.

2. All approved TIA schedule changes shall be shown on the next update schedule.

E. In the event of a TIA rejection:

1. If a TIA submitted by the Contractor is rejected by the Owner's Representative, the Contractor shall meet with the Owner's Representative to discuss and resolve issues related to the TIA.
2. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Owner's Representative to give notice.
3. Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules.
4. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule.
5. Owner's Representative will withhold remaining payment on the schedule contract item if a TIA is requested by Owner's Representative and not submitted by Contractor within 15 working days.
6. The schedule item payment will resume on the next estimate after the requested TIA is submitted.
    a. No other contract payment will be retained regarding TIA submittals.

1.15 NARRATIVE SCHEDULE REPORT

A. Narrative Schedule Report shall list Activities Started This Month; Activities Completed This Month; Activities Continued This Month; Activities Scheduled To Start or Complete Next Month; Problems Encountered This Month; Actions Taken to Solve These Problems.

B. Narrative Schedule Report shall describe changes made to Construction Schedule Logic (i.e., changes in Predecessors and Lags); Activities Added to Schedule; Activities Deleted from Schedule; any other changes made to Schedule other than addition of Actual Start Dates and Actual Finish Dates and changes of Data Date and Remaining Durations for recalculation of mathematical analysis.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

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SECTION 01 32 36.01

PROJECT PHOTOGRAPHS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Technical and submittal requirements for project photographs, including:

   a. Measurement and Payment

   b. Project photographs for facility and pipeline projects. Facility projects may have one or more distinct sites. Pipeline projects may have more than one segment but are usually linear in nature, such as waterline or wastewater line projects.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.

2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 DEFINITIONS:

1. Pre-construction Photographs: Photographs taken, in sufficient numbers and detail, prior to beginning field activities, to show original construction site conditions.

2. Progress Photographs: Photographs, taken throughout the duration of construction at regular intervals from vantage points, approved by the Owner's Representative, that document progress of the Work.

1.4 SUBMITTALS:

1. Refer to Section 01 33 00 – Submittals.

2. Format and Media. Digital photography shall be used for Preconstruction and Progress Photographs. Digital or film photography may be used for Completed Project Photographs. Submit color prints of photographs whether produced by digital or film photography for hard copy submittals. Submit digital Joint Photographic Experts Group (JPEG) images for electronic submittals.

a. Media

1) Film Photography. If film is used to make photographs, Submit negatives, in 3-hole punched plastic sheets with individual sleeves for each negative. Mark negative sleeves with project name and dates of photos. Use 35mm or larger color film for film photography. If film is used, a digital image of the photograph must also be submitted. Scanned photographs must equal or exceed 400 dots per inch when scanned from 8-inch by 10-inch prints

2) Digital Photography. Use at least 6.0 megapixel density for photographs. Submit digital photographic files on compact disks (CD) in JPEG format. Submit disks in 3-hole punched plastic sheets with a maximum of two CD's per sheet. Mark disks with project name and dates of photos.

3. Submittal Quantities and Frequencies

a. Preconstruction photographs: Submit one set of photo prints and one set of digital images.

1) For Facility Projects, multiple photographs shall be taken of the project site to document existing facilities, parking areas, driveways, surface features such as building, trees and other vegetation or landscaping. This shall be accomplished through the use of a 100 foot interval grid (50 foot grid for sites less than 1 acre) imposed on the site with photos taken at each node point along the grid lines (4 photos per node) or by other means as approved by the Owner's Representative.

b. Progress Photographs: Submit one set of Progress Photos prints and one set of digital images each month with each Application for Payment. Monthly Applications for Payment shall be deemed incomplete if not accompanied by the required Progress Photographs. Contractor's failure or election to not submit a monthly Application for Payment shall not affect the requirement for monthly Progress Photographs:

1) For Facility Contracts with a Total Bid Price over $100,000, at least once each month during construction: Provide five (5) progress photos as directed by Owner's Representative.

2) For Facility Contracts with a Total Bid Price over $2,000,000, at least once each month during construction: Provide a commercial photographer to take progress photos as directed by Owner's Representative. Provide ten (10) ground level color photos (printed 8" x 10") and digital images per month from fixed vantage points, with vantage points approved by the Owner's Representative.

3) For Facility Contacts with Total Bid Price over $10,000,000 in addition to ground level photos: Provide at least two (2) color aerial photos prints and digital images taken at;

a) At 0 percent complete

b) At three (3) month intervals after the initial set

c) At substantial completion

d) In the first summer operational season but at least six (6) months after facility start up. Submittal of these photos may extend past the final completion of the project and shall not prevent project closeout.

4) For Pipeline Contracts: Provide at least four (4) ground level color photo prints (8" x 10") and digital images of the Work with at least one photo taken approximately each week (one week apart) during the monthly period to show progress of the Work with locations and direction of the photo approved by the Owner's Representative.

c. Completed Project Photographs:

1) For Facility Contracts submit two sets of Completed Project Photographs, after Date of Substantial Completion and prior to final payment. Two sets of Completed Project photos shall be taken from two vantage points. Each of the two vantage points pre-approved by the Owner. Vantage points for Finished Photographs will be approved separately from vantage points approved for Progress Photographs.

2) For Pipeline Contracts, Completed Project Photographs are not required unless otherwise specified.

4. Labeling:

a. Photo Prints; Place a label on the back of each photographic print, applied so as to not to show through on the front. Labels shall contain the following information:

1) Name of Project and Project Number, unless embedded on the print

2) Name of Contractor.

3) Date photograph was taken, unless embedded on the print or image.

4) Location of the photograph (station or coordinates or other notation, unless embedded on the print or image)

5) Short description of photo subject.

6) Name and address of commercial photographer who took the photograph, if applicable.

b. Digital Images: Place a label on the CD, Labels shall contain the following information:

1) Name of Project and Project Number

2) Name of Contractor.

3) Name and address of commercial photographer who took the photograph, if applicable

4) For each digital image create a file name which has as part of the name the date the photograph was taken and the location of the photograph by station, coordinates or other unique identifier

5. Hand-deliver or transmit Completed Project Photo prints in standard photographic mailers marked "Photographs - Do Not Bend."

6. Photographic prints, negatives, photographic files and disks become the property of the Owner with all rights of reproduction to the Owner. Do not publish photographs without written consent by the Owner.

B. Quality Assurance:

1. Contractor shall be responsible for the quality of and timely execution and submittal of photographs.

2. Contractor shall schedule and coordinate photographer with Owner's Representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanics and administration of the submittal process for:
    a. Shop Drawings.
    b. Samples.
    c. Miscellaneous submittals.
    d. Operation and Maintenance Manuals.
2. General content requirements for Shop Drawings.
3. Content requirements for Operation and Maintenance Manuals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.
3. Sections in Divisions 02 through 48 identifying required submittals.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 DEFINITIONS

A. Shop Drawings:

1. See General Conditions.
2. Product data and samples are Shop Drawing information.

B. Operation and Maintenance (O&M) Manuals:

1. Contain the information required for proper installation and maintenance of building materials and finishes.
2. Contain the technical information required for proper installation, operation and maintenance of process, electrical and mechanical equipment and systems.

C. Miscellaneous Submittals:

1. Submittals other than Shop Drawings and O&M Manuals.

2. Representative types of miscellaneous submittal items include but are not limited to:
    a. Construction schedule.
    b. Facility Shutdown Plan(s)
    c. HVAC test and balance reports.
    d. Installed equipment and systems performance test reports.
    e. Manufacturer's installation certification letters.
    f. Instrumentation and control commissioning reports.
    g. Warranties.
    h. Service agreements.
    i. Construction photographs.
    j. Record Documents.
    k. Cost breakdown (Schedule of Values).
    l. Safety Plan(s).

1.5 SUBMITTAL SCHEDULE

A. Schedule of Shop Drawings:
    1. Submitted and approved within 20 days of receipt of Notice to Proceed.
    2. Account for multiple transmittals under any specification section where partial submittals will be transmitted.
B. Shop Drawings: Submittal and approval prior to 50 percent completion.
C. Operation and Maintenance Manuals and Completed Equipment Record Sheets: Initial submittal within 60 days after date Shop Drawings are approved.

1.6 PREPARATION OF SUBMITTALS

A. General:
    1. All submittals and all pages of all copies of a submittal shall be completely legible.
    2. Submittals which, in the Owner’s Representative’s or Principal Architect/Engineer’s sole opinion, are illegible will be returned without review.
B. Shop Drawings:
    1. Scope of any submittal and shop drawing transmittal:
        a. Submit shop drawings utilizing Owner’s standard Submittal Transmittal Form.
        b. Limited to one (1) Specification Section.

c. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a “Basic Requirements” Section.

2. Numbering letter of transmittal:
   a. Include a series number, "xx", beginning with "01" and increasing sequentially with each additional transmittal.
   b. Assign consecutive series numbers to subsequent transmittals.
3. Describing transmittal contents:
   a. Provide listing of each component or item in submittal capable of receiving an independent review action.
   b. Identify for each item:
      1) Manufacturer and Manufacturer's Drawing or data number.
      2) Contract Document tag number(s).
      3) Unique page numbers for each page of each separate item.
      4) Use divider sheets with labeled tabs to separate independent items within a single submittal.
   c. When submitting "or-equal" items that are not the products of named manufacturers, include the words "or-equal" in the item description.
4. Contractor stamping:
   a. General:
      1) Contractor's review and approval stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
         a) Contractor's signature and date shall be wet ink signature. Is an electronic signature acceptable as most submittals are uploaded to SharePoint as a .PDF electronic document?
         b) Shop Drawing submittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated under General Conditions Paragraph 6.20.4."
      2) Submittals containing multiple independent items shall be prepared with an index sheet for each item listing the discrete page numbers for each page of that item, which shall be stamped with the Contractor's review and approval stamp.
         a) Individual pages or sheets of independent items shall be numbered in a manner that permits Contractor's review and approval stamp to be associated with the entire contents of a particular item.

b) Use divider sheets with labeled tabs to separate independent items within a single submittal.

b. Electronic stamps:

1) Contractor may electronically embed Contractor's review and approval stamp to either the Submittal Transmittal Form or a separate index sheet preceding each independent item in the submittal.

2) Contractor's signature and date on electronically applied stamps shall be wet ink signature. Is an electronic signature acceptable as most submittals are uploaded to SharePoint as a PDF electronic document?

5. Resubmittals:

a. Number with original root number and a suffix letter starting with "A" on a new Submittal Transmittal Form.

b. Do not increase the scope of any prior transmittal.

c. Account for all components of prior transmittal.

1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate (See also 1.6, this Section).

a) Do not include submittal information for items listed with prior "A" or "B" in resubmittal.

2) Indicate items to be resubmitted “at a later date” for any prior "C" or "D" Action item not included in resubmittal.

a) Obtain Principal Architect/Engineer’s approval to exclude items.

6. For 8-1/2 x 11 In, 8-1/2 x 14 In, and 11 x 17 In hard copy size sheets, provide three (3) copies of each page for Principal Architect/Engineer’s plus the number required by the Contractor. In today’s electronic environment, is subsection No. 6 necessary to be included in the contract documents?

a. The number of copies required by the Contractor will be defined at the Preconstruction Conference, but shall not exceed four (4) hard copies.

b. All other hard copy size sheets:

1) Submit one (1) reproducible transparency or high resolution print and one (1) additional print of each Drawing until approval is obtained.

2) Utilize mailing tube; do not fold.

3) The Principal Architect/Engineer will mark and return the reproducible to the Contractor through the Owner’s Representative for his reproduction and distribution.

7. Electronic submittals utilizing web based document management system (SharePoint®):

a. Shop drawing submittals shall be produced (scanned) in Adobe Acrobat's Portable Document Format (PDF) Version 5.0 or higher.

b. Do not password protect and/or lock the PDF document.

c. Create one (1) PDF document (PDF file) for each submittal.

d. Drawings or other graphics must be converted to PDF format and made part of the singe (one [1]) PDF document.

   1) Scanning to be used only where actual file conversion is not possible.

e. Limit PDF document size to 5MB.

f. Rotate pages that must be viewed in landscape to the appropriate position for easy reading.

g. Images only shall be scanned at a resolution of 300 dpi or greater.

   1) Perform Optical Character Recognition (OCR) capture on all images.

   2) Achieve OCR with the "original image with hidden text" option.

   3) Word searches of the PDF document must operate successfully to demonstrate OCR compliance.

h. Create bookmarks in the navigation frame, for each entry in the Table of Contents/Index.

   1) Normally three (3) levels deep (i.e., "Chapter," "Section," "Sub-section").

i. Thumbnails must be generated for each PDF file.

j. Set the opening view for PDF files as follows:

   1) Initial view: Bookmarks and Page.

   2) Magnification: Fit in Window.

   3) Page layout: Single page.

   4) Set the file to open to the cover page of the submittal with bookmarks to the left, and the first bookmark linked to the cover page.

k. All PDF documents shall be set with the option "Fast Web View" to open the first pages of the document for the viewer while the rest of the document continues to load.

l. File naming conventions:

   1) File names shall use a "nine dot three" convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the Shop Drawing Root series number and Z is an ID number used to designate the associated volume.

      a) Example 1:

         (1) Two (2) pumps submitted as separate Shop Drawings under the same Specification Section:

            (a) Pump 1 = 43 21 21-01-1.pdf.

(b) Pump 2 = 43 21 21-02-1.pdf.

b) Example 2:

(1) Control system submitted as one (1) Shop Drawing but separated into two (2) shop drawing submittals:

(a) Volume 1 = 40 90 00-01-1.pdf.

(b) Volume 2 = 40 90 00-01-2.pdf.

8. Provide clear space (3 In Sq) for Principal Architect/Engineer stamping of each component defined in the PREPARATION OF SUBMITTALS Article – Contractor Stamping.
9. Contractor shall not use red color for marks on transmittals.
   a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
   b. Outline Contractor marks on reproducible transparencies with a rectangular box.
10. Transmittal contents:
   a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Owner's Representative and the Principal Architect/Engineer.
   b. Identify equipment or material use, tag number, Drawing detail reference, weight, and other Project specific information.
   c. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.
   d. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets on 8-1/2 x 11 In pages.
      1) Clearly mark (indicate) exact item or model and all options proposed.
   e. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data in addition to information specifically stipulated in the Specification Section.
      1) Arrange data and performance information in format similar to that provided in Contract Documents.
      2) Provide, at minimum, the detail specified in the Contract Documents.
   f. Provide warranty information.

g. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet.

11. Samples:

a. Identification:

1) Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, standard Specification Section or Drawing detail reference, color, range, texture, finish and other pertinent data.

2) If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.

b. Include application specific brochures, and installation instructions.

c. Provide Contractor's stamp of approval on samples or transmittal form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.

d. Resubmit samples of rejected items.

C. Miscellaneous Submittals:

1. Prepare in the format and detail specified in Specification requiring the miscellaneous submittal.

D. Operation and Maintenance Manuals:

1. Owner's use of manufacturer's Operation and Maintenance materials:

a. Materials are provided for Owner's use, reproduction and distribution as training and reference materials within Owner's organization.

1) Applicable to hard copy or electronic media.

2) Applicable to materials containing copyright notice as well as those with no copyright notice.

b. Notify manufacturer of this intended use of materials provided under the Contract.

2. Number each Operation and Maintenance Manual transmittal with the original root number of the associated Shop Drawing.

a. Identify resubmittals with the original number plus a suffix letter starting with "A."

3. Submittal format:

a. Interim submittals: Submit two (2) paper copies until manual is approved.

b. Final submittals:

1) Within 30 days of receipt of approval, submit one (1) additional paper copy and two (2) electronic copies to the Owner's Document Management System (SharePoint) in Portable Document Format (PDF).
    a) Compact discs to be secured in jewel cases.
2) Electronic copies will be reviewed for conformance with the approved paper copy and the electronic copy (PDF) requirements of this Specification.
3) Non-conforming CDs will be returned with comments.
    a) Provide final CDs within 30 days of receipt of comments.

4. Paper copy submittals:
    a. Submit Operation and Maintenance Manuals printed on 8-1/2 x 11 In size heavy first quality paper with standard three-hole punching and bound in appropriately sized three-ring (or post) vinyl view binders with clear overlays front, spine and back.
        1) Provide binders with titles inserted under clear overlay on front and on spine of each binder.
            a) As space allows, binder titles shall include, but not necessarily be limited to, Project Name, related Specification Number, Equipment Name(s) and Project Equipment Tag Numbers.
        2) Provide a Cover Page for each manual with the following information:
            a) Manufacturer(s).
            b) Date.
            c) Project Owner and Project Name.
            d) Specification Section.
            e) Project Equipment Tag Numbers.
            f) Model Numbers.
            g) Principal Architect/Engineer.
            h) Contractor.
        3) Provide a Table of Contents or Index for each manual.
        4) Use plastic-coated dividers to tab each section of each manual per the manual's Table of Contents/Index for easy reference.
        5) Provide plastic sheet lifters prior to first page and following last page.
    b. Reduce Drawings or diagrams bound in manuals to an 8-1/2 x 11 In or 11 x 17 In size.

1) Where reduction is not practical to ensure readability, fold larger Drawings separately and place in vinyl envelopes which are bound into the binder.

2) Identify vinyl envelopes with Drawing numbers.

c. Mark each sheet to clearly identify specific products and component parts and data applicable to the installation for the Project.

1) Delete or cross out information that does not specifically apply to the Project.

5. Electronic copy submittals:

a. Electronic copies of the approved paper copy Operation and Maintenance Manuals are to be produced in Adobe Acrobat's Portable Document Format (PDF) Version 5.0 or higher.

b. Do not password protect and/or lock the PDF document.

c. Create one (1) PDF document (PDF file) for each equipment O&M Manual.

d. Drawings or other graphics must be converted to PDF format and made part of the one (1) PDF document.

1) Scanning to be used only where actual file conversion is not possible.

e. Rotate pages that must be viewed in landscape to the appropriate position for easy reading.

f. Images only shall be scanned at a resolution of 300 dpi or greater.

1) Perform Optical Character Recognition (OCR) capture on all images.

2) Achieve OCR with the "original image with hidden text" option.

3) Word searches of the PDF document must operate successfully to demonstrate OCR compliance.

g. Create bookmarks in the navigation frame, for each entry in the Table of Contents/Index.

1) Normally three (3) levels deep (i.e., "Chapter," "Section," "Sub-section").

h. Thumbnails must be generated for each PDF file.

i. Set the opening view for PDF files as follows:

1) Initial view: Bookmarks and Page.

2) Magnification: Fit in Window.

3) Page layout: Single page.

4) Set the file to open to the cover page of the manual with bookmarks to the left, and the first bookmark linked to the cover page.

j. All PDF documents shall be set with the option "Fast Web View" to open the first pages of the document for the viewer while the rest of the document continues to load.

k. File naming conventions:

1) File names shall use a "ten dot three" convention (XXXXXX-YY-Z.PDF) where XXXXXX is the Specification Section number, YY is the Shop Drawing Root number and Z is an ID number used to designate the associated volume.

a) Example 1:

(1) Two (2) pumps submitted as separate Shop Drawings under the same Specification Section:

(a) Pump 1 = 43 21 21-01-1.pdf.

(b) Pump 2 = 43 21 21-02-1.pdf.

b) Example 2:

(1) Control system submitted as one (1) Shop Drawing but separated into two (2) O&M volumes:

(a) Volume 1 = 40 90 00-01-1.pdf.

(b) Volume 2 = 40 90 00-01-2.pdf.

l. Labeling:

1) As a minimum, include the following labeling on all CD-ROM discs and jewel cases:

a) Project Name.

b) Equipment Name and Project Tag Number.

c) Project Specification Section.

d) Manufacturer Name.

e) Vendor Name.

m. Binding:

1) Include labeled CD(s) in labeled jewel case(s).

a) Bind jewel cases in standard three-ring binder Jewel Case Page(s), inserted at the front of the Final paper copy submittal.

b) Jewel Case Page(s) to have means for securing Jewel Case(s) to prevent loss (e.g., flap and strap).

6. Operation and Maintenance Manuals for Materials and Finishes:

a. Building Products, Applied Materials and Finishes:

1) Include product data, with catalog number, size, composition and color and texture designations.

2) Provide information for re-ordering custom manufactured products.

b. Instructions for Care and Maintenance:

1) Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and recommended schedule for cleaning and maintenance.

c. Moisture Protection and Weather Exposed Products:

1) Include product data listing, applicable reference standards, chemical composition, and details of installation.

2) Provide recommendations for inspections, maintenance and repair.

d. Additional requirements as specified in individual product specifications.

7. Operation and Maintenance Manuals for Equipment and Systems:

a. Submission of Operation and Maintenance Manuals for equipment and systems is applicable but not necessarily limited to:

1) Major equipment.

2) Equipment powered by electrical, pneumatic or hydraulic systems.

3) Specialized equipment and systems including instrumentation and control systems and system components for HVAC process system control.

4) Valves and water control gates.

b. Equipment and Systems Operation and Maintenance Manuals shall include, but not necessarily be limited to, the following completed forms and detailed information, as applicable:

1) Fully completed type-written copies of the associated Equipment Record(s), Exhibits A1, A2 and A3, shall be included under the first tab following the Table of Contents of each Operation and Maintenance Manual.

a) Each section of the Equipment Record must be completed in detail.

(1) Simply referencing the related manual for nameplate, maintenance, spare parts or lubricant information is not acceptable.

b) For equipment items involving components or subunits, a fully completed Equipment Record Form is required for each operating component or subunit.

c) Submittals that do not include the associated Equipment Record(s) will be rejected without further content review.

d) Electronic copies of the Exhibits may be obtained by contacting the Project Manager.

2) Equipment function, normal operating characteristics, limiting operations.

3) Assembly, disassembly, installation, alignment, adjustment, and checking instructions.

4) Operating instructions for start-up, normal operation, control, shutdown, and emergency conditions.

5) Lubrication and maintenance instructions.

6) Troubleshooting guide.

7) Parts lists:

   a) Comprehensive parts and parts price lists.

   b) A list of recommended spare parts.

   c) List of spare parts provided as specified in the associated Specification Section.

8) Outline, cross-section, and assembly Drawings; engineering data; and electrical diagrams, including elementary diagrams, wiring diagrams, connection diagrams, word description of wiring diagrams and interconnection diagrams.

9) Test data and performance curves.

10) As-constructed fabrication or layout Drawings and wiring diagrams.

11) Instrumentation or tag numbers assigned to the equipment by the Contract Documents are to be used to identify equipment and system components.

12) Additional information as specified in the associated equipment or system Specification Section.

1.7 TRANSMITTAL OF SUBMITTALS

A. Shop Drawings, Samples and Operation and Maintenance Manuals:

1. Transmit all submittals via Owner's Document Management System (SharePoint).
2. Transmit all paper submittals to the address provided below.

San Jacinto River Authority

2436 Sawdust Road

The Woodlands, Texas 77380

Attn: Eduardo Maldonado

3. Utilize SJRA Standard Submittal Transmittal Form (to be provided by Owner) to transmit all Shop Drawings, Samples and Operation and Maintenance Manuals.
4. All submittals must be from Contractor.
    a. Submittals will not be received from or returned to subcontractors.
    b. Operation and Maintenance Manual submittal stamp may be Contractor's standard approval stamp.
5. Provide submittal information defining specific equipment or materials utilized on the Project.
    a. Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.

B. Miscellaneous Submittals:
1. Transmit under Contractor's standard Submittal Transmittal Form or letterhead.
2. Submit in triplicate or as specified in individual Specification Section.
3. Transmit to the address provided below.

San Jacinto River Authority

2436 Sawdust Road

The Woodlands, Texas 77380

Attn: Eduardo Maldonado

4. Provide copy of Submittal Transmittal without attachments to Owner's Representative.

C. Expedited Return Delivery:
1. Include prepaid express envelope or airbill in submittal transmittal package for any submittals Contractor expects or requires express return mail.
2. Inclusion of prepaid express envelope or airbill does not obligate Owner’s Representative or Principal Architect/Engineer to conduct expedited review of submittal.

D. Fax Transmittals:
1. Permitted on a case-by-case basis to expedite review when approved by Principal Architect/Engineer.
2. Requires hard copy transmittal to immediately follow.
    a. Principal Architect/Engineer will proceed with review of fax transmittal.

b. Principal Architect/Engineer 's approval or rejection comments will be recorded and returned on hard copy transmittal.

3. Provisions apply to both:

a. Initial transmittal contents.

b. Supplemental information required to make initial transmittal contents complete.

1.8 PRINCIPAL ARCHITECT/ENGINEER 'S REVIEW ACTION

A. Shop Drawings and Samples:

1. Items within transmittals will be reviewed for overall design intent and will receive one of the following actions:

a. NO EXCEPTION.

b. EXCEPTIONS AS NOTED.

c. REVISE & RESUBMIT

d. REJECTED - RESUBMIT.

e. ACKNOWLEDGE RECEIPT.

f. FOR INFORMATION PURPOSES ONLY.

g. SUPPLEMENTARY INFORMATION.

2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp.

a. Submittals not stamped by the Contractor or stamped with a stamp containing language other than that specified herein will not be reviewed for technical content and will be returned without any action.

3. In relying on the representation on the Contractor’s review and approval stamp, Owner and Principal Architect/Engineer reserve the right to review and process poorly organized and poorly described submittals as follows:

a. Submittals transmitted with a description identifying a single item and found to contain multiple independent items:

1) Review and approval will be limited to the single item described on the transmittal letter.

2) Other items identified in the submittal will:

a) Not be logged as received by the Principal Architect/Engineer.

b) Be removed from the submittal package and returned without review and comment to the Contractor for coordination, description and stamping.

c) Be submitted by the Contractor as a new series number, not as a re-submittal number.

b. Principal Architect/Engineer, at Principal Architect/Engineer's discretion, may revise the transmittal letter item list and descriptions, and conduct review.

1) Unless Contractor notifies Principal Architect/Engineer in writing that the Principal Architect/Engineer's revision of the Submittal Transmittal Form item list and descriptions was in error, Contractor's review and approval stamp will be deemed to have applied to the entire contents of the submittal package.

4. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation.

a. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.

b. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.

5. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:

a. The portion of the submittal given "C" or "D" will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference).

1) One (1) copy or the one (1) transparency of the "C" or "D" Drawings will be marked up and returned to the Contractor.

a) Correct and resubmit items so marked.

b. Items marked "A" or "B" will be fully distributed.

c. If a portion of the items or system proposed are acceptable, however, the major part of the individual Drawings or documents are incomplete or require revision, the entire submittal may be given "C" or "D" Action.

1) This is at the sole discretion of the Principal Architect/Engineer.

2) In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."

3) Distribution to the Owner and field will not be made (unless previously agreed to otherwise).

6. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Contractor with "C" or "D" Action.

7. Calculations: Requirements for the submittal of calculations in the individual Specification Sections shall be satisfied through the submittal of a certification sealed by the Principal Architect/Engineer that the calculations

have been performed. Certification will be received for information purposes only and will be returned stamped "D. ACKNOWLEDGE RECEIPT ".

8. Transmittals of submittals which the Principal Architect/Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" Action in a prior submittal, will be returned with Action "E. Acknowledge Receipt" (Principal Architect/Engineer 's Review Not Required).
9. Samples may be retained for comparison purposes.
   a. Remove samples when directed.
   b. Include in bid all costs of furnishing and removing samples.
10. Approved samples submitted or constructed, constitute criteria for judging completed work.
    a. Finished work or items not equal to samples will be rejected.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

EXHIBIT A1

Equipment Record

Equipment Data and Spare Parts Summary

Project Name					Specification Section:
Equipment Name					Year Installed:
Project Equipment Tag No(s).					
Equipment Manufacturer				Project/ Order No.	
Address				Phone	
Fax	Web Site		E-mail		
Local Vendor/Service Center					
Address				Phone	
Fax	Web Site		E-mail		

MECHANICAL NAMEPLATE DATA				
Equip.		Serial No.		
Make		Model No.		
ID No.	Frame No.	HP	RPM	Cap.
Size	TDH	Imp. Sz.	CFM	PSI
Other:				

ELECTRICAL NAMEPLATE DATA								
Equip.				Serial No.				
Make				Model No.				
ID No.	Frame No.	HP	V.	Amp.	HZ	PH	RPM	SF

Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating

Other:

SPARE PARTS PROVIDED PER CONTRACT

Part No.	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

EXHIBIT A2

Equipment Record

Recommended Maintenance Summary

Equipment Description	Project Equip. Tag No(s).

RECOMMENDED BREAK-IN MAINTENANCE (FIRST OIL CHANGES, ETC.)	INITIAL COMPLETION * FOLLOWING START-UP						
	D	W	M	Q	S	A	Hours

RECOMMENDED PREVENTIVE MAINTENANCE	PM TASK INTERVAL *						
	D	W	M	Q	S	A	Hours

* D = Daily W = Weekly M = Monthly Q = Quarterly S = Semiannual A = Annual Hours

EXHIBIT A3

Equipment Record

Lubrication Summary

Equipment Description	Project Equip. Tag No(s).

Lubricant Point

Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point

Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point

Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point

Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point

Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point

Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

END OF SECTION

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SECTION 01 35 05

ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Addresses:

1. Minimizing the pollution of air, water, or land; control of noise, the disposal of solid waste materials, and protection of deposits of historical or archaeological interest.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Prices. No separate payment will be made for this item. Include the cost of same in associated items for this project.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 – Submittals for requirements for the mechanics and administration of the submittal process.
2. Prior to the start of any construction activities submit:
   a. A detailed proposal of all methods of control and preventive measures to be utilized for environmental protection.
   b. A drawing of the work area, haul routes, storage areas, access routes and current land conditions including trees and vegetation.
   c. Submit manufacturer's catalog sheets and other product data on dispensing equipment, pump, and aboveground fuel storage tanks, indicating capacity and dimensions of tank.
   d. Submit drawings to show location of tank protection area and driveway. Indicate nearest inlet or channelized flow area. Clearly dimension distances and measurements.
   e. Submit list of spill containment equipment, and quantities thereof, located at fueling area.

1.4 ENVIRONMENTAL CONTROLS

A. Provide and maintain methods, equipment, and temporary construction as necessary for controls over environmental conditions at construction site and adjacent areas.

B. Work to minimize impact to surrounding environment. Adopt construction procedures that do not cause unnecessary excavation and filling of terrain, indiscriminate destruction of vegetation, air or stream pollution, nor harassment or destruction of wildlife.

C. Recognize and adhere to environmental requirements of Project. Limit disturbed areas to boundaries established by Contract. Avoid pollution of "on-site" streams, sewers, wells, or other water sources.

D. Burning of rubbish, debris, or waste materials is not permitted.

1.5 POLLUTION CONTROL

A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by discharge of noxious substances from construction operations.

B. Provide equipment and personnel to perform required emergency measures to contain spillage, and to remove contaminated soils or liquids. Excavate and dispose of contaminated earth off-site, and replace with suitable compacted fill and topsoil.

C. Provide systems for control of atmospheric pollutants.

1. Prevent toxic concentrations of chemicals.
2. Prevent harmful dispersal of pollutants into atmosphere.

D. Use equipment that conforms to current Federal, State, and local laws and regulations.

E. Install or otherwise implement positive controls to prevent hazardous materials migrating from Work area.

1.6 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.

B. Employ methods and use materials which will not adversely affect conditions at site or on adjoining properties.

1.7 NOISE CONTROL

M. Provide vehicles, equipment, and construction activities that minimize noise to greatest degree practicable. Conform noise levels to latest OSHA standards. Do not permit noise levels to interfere with Work or create nuisance in surrounding areas.

N. Conduct construction operations during daylight hours except as approved by Owner's Representative.

O. Select construction equipment to operate with minimum noise and vibration. When in opinion of Owner's Representative, objectionable noise or vibration is produced by equipment, rectify conditions without additional cost to Owner. Sound Power Level (PWL) of equipment shall not exceed 85 dbA (re: 10-12 watts) measured 5 feet from piece of equipment. Explicit equipment noise requirements are specified with equipment specifications.

1.8 DUST CONTROL

A. Control objectionable dust caused by operation of vehicles and equipment. Apply water or use other methods, subject to approval of Owner's Representative, to control amount of dust generated.

1.9 WATER RUNOFF AND EROSION CONTROL

A. Comply with Texas Pollutant Discharge Elimination System (TPDES) permit when required.

B. In addition to TPDES requirements:

1. Provide methods to control surface water, runoff, subsurface water, and water from excavations and structures to prevent damage to Work, site, or adjoining properties.
2. Control fill, grading and ditching to direct water away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff courses so as to prevent erosion, sedimentation or damage.
3. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
4. Dispose of drainage water in manner to prevent flooding, erosion, or other damage to portion of site or to adjoining areas and in conformance with environmental requirements.
5. Retain existing drainage patterns external to construction site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as needed to control conditions.
6. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
   a. Minimize area of bare soil exposed at one time.
   b. Provide temporary control measures, as berms, dikes, and drains.
7. Construct fills and waste areas by selective placement to eliminate erosion of surface silts or clays.
8. Inspect earthwork periodically to detect evidence of start of erosion. Apply corrective measures as required to control erosion.

1.10 QUALITY ASSURANCE

A. Person conducting visual examination for pollutant shall be fully knowledgeable about the TPDES Construction General Permit, detecting sources of storm water contaminants, inspection of aboveground storage tank and appurtenances for leakage, and the day-to-day operations that may cause unexpected pollutant releases.

PART 2 - PRODUCTS

2.1 ABOVEGROUND FUEL STORAGE TANK

A. Tank Assembly: Must be listed with UL 1709 and UL 2085.

B. Inner Steel Storage Tank: Follow UL 142, with minimum thickness of ⅛-inch welded construction.

C. Tank Encasement: Either concrete or steel to provide minimum of 110 percent containment of inner tank capacity. Provide 5-gallon overspill containment pan for tank refueling.

D. Dispenser Pump: For submersible pump, UL listed emergency shut-off valve to be installed at each dispenser. For suction pump, UL listed vacuum-activated shut-off valve, with shear section, is to be installed at each dispenser. Fuel may not be dispensed from tank by gravity flow or by pressurization of tank. Means must be provided to prevent release of fuel by siphon flow.

E. Representative Manufacturers: Convault, Fireguard, Ecovault, SuperVault, or equal.

2.2 CONCRETE

A. Provide concrete with minimum strength of 4,000 psi at 28 days.

2.3 AGGREGATES

A. Coarse aggregate shall consist of crushed stone, gravel, crushed blast furnace slag, or combination of these materials. Aggregate shall be composed of clean, hard, durable materials, free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials, or organic and injurious matter.

B. Coarse aggregates shall conform to following gradation requirements.

Sieve Size	**Percent Retained**
(Square Mesh)	(By Weight)
2-1/2"	0
2"	0 - 20
1-1/2"	15 - 50
3/4"	60 - 80
No. 4	95 - 100

PART 3 - EXECUTION

3.1 INSTALLATION

A. Employ and utilize environmental protection methods, obtain all necessary permits, and fully observe all local, state, and federal regulations.

B. No clearing and grubbing or rough cutting permitted until erosion and sediment control systems are in place, other than site Work specifically directed by Owner's Representative to allow soil testing and surveying.

C. Prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights-of-way and easements for construction. Immediately repair damage caused by construction traffic to erosion and sediment control systems.

D. Maintain existing erosion and sediment control systems located within project site until acceptance of Project or until directed by Owner's Representative to remove and discard existing system.

E. Regularly inspect and repair or replace damaged components of erosion and sediment control systems as specified in this Section. Unless otherwise directed, maintain erosion and sediment control systems until project area stabilization is accepted by the Owner. Remove erosion and sediment control systems promptly when directed by Owner's Representative. Discard removed materials off site.

F. Remove and dispose sediment deposits at designated spoil site for Project. If a project spoil site is not designated on Drawings, dispose of sediment off site at location not in or adjacent to stream or flood plain. Assume responsibility for off-site disposal. Spread sediment evenly throughout site, compacted and stabilized. Prevent sediment from flushing into a stream or drainage way. If sediment has been contaminated, dispose of in accordance with existing federal, state, and local rules and regulations.

G. Assume responsibility for collecting, storing, hauling, and disposing of spoil, silt, and waste materials as specified in this or other Specifications and in compliance with applicable federal, state, and local rules and regulations.

H. Employ protective measures to avoid damage to existing trees to be retained on project site. Conduct construction operations under this Contract in conformance with erosion control practices described in Drawings and this or other Specifications.

I. Prepare spill response and containment procedures to be implemented in event of significant materials spill. Significant materials include but are not limited to: raw materials; fuels; materials such as solvent, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of CERCLA; chemical required to be reported pursuant to Section 313 of Title III of SARA; fertilizers; pesticides, and waste products such as slag,

ashes and sludge that have potential to be released with storm water discharges. Spill containment procedures shall be kept on-site or in construction field office.

J. Spill containment equipment appropriate to size of operation is to be located in close proximity of fueling area. Such equipment includes, but not limited to, suitable waste containers for significant materials, drip pans, booms, inlet covers, or absorbent.

K. Properly label significant materials or waste containers used for construction activities and stored on-site overnight.

L. Install, maintain, and inspect erosion, sediment control measures and practices as specified in Drawings and in this or other Specifications

M. Land Protection:

1. Except for any work or storage area and access routes specifically assigned for the use of the Contractor, the land areas outside the limits of construction shall be preserved in their present condition.
    a. Contractor shall confine his construction activities to areas defined for work within the Contract Documents.
2. Manage and control all borrow areas, work or storage areas, access routes and embankments to prevent sediment from entering nearby water or land adjacent to the work site.
3. Restore all disturbed areas including borrow and haul areas and establish permanent type of locally adaptable vegetative cover.
4. Unless earthwork is immediately paved or surfaced, protect all side slopes and backslopes immediately upon completion of final grading.
5. Plan and execute earthwork in a manner to minimize duration of exposure of unprotected soils.
6. Except for areas designated by the Contract Documents to be cleared and grubbed, the Contractor shall not deface, injure or destroy trees and vegetation, nor remove, cut, or disturb them without approval of the Owner’s Representative.
    a. Any damage caused by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the Contractor's expense.
7. Utilize, as necessary, erosion control methods to protect side and backslopes, minimize and the discharge of sediment to the surface water leaving the construction site as soon as rough grading is complete.
    a. These controls shall be maintained until the site is ready for final grading and landscaping or until they are no longer warranted and concurrence is received from the Owner’s Representative.
    b. Physically retard the rate and volume of run-on and runoff by:

1) Implementing structural practices such as diversion swales, terraces, straw bales, silt fences, berms, storm drain inlet protection, rocked outlet protection, sediment traps and temporary basins.
2) Implementing vegetative practices such as temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffers, hydroseeding, anchored erosion control blankets, sodding, vegetated swales or a combination of these methods.
3) Providing Construction sites with graveled or rocked access entrance and exit drives and parking areas to reduce the tracking of sediment onto public or private roads.

8. Discharges from the construction site shall not contain pollutants at concentrations that produce objectionable films, colors, turbidity, deposits or noxious odors in the receiving stream or waterway.

N. Solid Waste Disposal:

1. Collect solid waste on a daily basis.
2. Provide disposal of degradable solid waste to an approved solid waste disposal site.
3. Provide disposal of nondegradable solid waste to an approved solid waste disposal site or in an alternate manner approved by Owner's Representative and regulatory agencies.
4. No building materials wastes or unused building materials shall be buried, dumped, or disposed of on the site.

O. Fuel and Chemical Handling:

1. Store and dispose of chemical wastes in a manner approved by regulatory agencies.
2. Take special measures to prevent chemicals, fuels, oils, greases, herbicides, and insecticides from entering drainage ways.
3. Do not allow water used in onsite material processing, concrete curing, cleanup, and other waste waters to enter a drainage way(s) or stream.
4. The Contractor shall provide containment around fueling and chemical storage areas to ensure that spills in these areas do not reach waters of the state.

P. Control of Dust:

1. The control of dust shall mean that no construction activity shall take place without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne so that it remains visible beyond the limits of construction.

a. Reasonable measures may include paving, frequent road cleaning, planting vegetative groundcover, application of water or application of chemical dust suppressants.

b. The use of chemical agents such as calcium chloride must be approved by the State of Texas DOT.

2. Utilize methods and practices of construction to eliminate dust in full observance of agency regulations.

3. The Owner's Representative will determine the effectiveness of the dust control program and may request the Contractor to provide additional measures, at no additional cost to Owner.

Q. Burning:

1. Do not burn material on the site.

2. If the Contractor elects to dispose of waste materials by burning, make arrangements for an off-site burning area and conform to all agency regulations.

R. Control of Noise:

1. Control noise by fitting equipment with appropriate mufflers.

S. Completion of Work:

1. Upon completion of work, leave area in a clean, natural looking condition.

2. Ensure all signs of temporary construction and activities incidental to construction of required permanent work are removed.

T. Historical Protection:

1. If during the course of construction, evidence of deposits of historical or archaeological interests is found, cease work affecting find and notify Owner's Representative.

a. Do not disturb deposits until written notice from Owner's Representative is given to proceed.

2. The Contractor will be compensated for lost time or changes in construction to avoid the find based upon normal change order procedures.

3.2 TOPSOIL PLACEMENT FOR EROSION AND SEDIMENT CONTROL SYSTEMS

A. When topsoil is specified as a component of another Specification, conduct erosion control practices described in this Specification during topsoil placement operations.

B. When placing topsoil, maintain erosion and sediment control systems consisting of swales, grade stabilization structures, berms, dikes, waterways, and sediment basins.

C. Maintain grades which have been previously established on areas to receive topsoil.

D. After areas to receive topsoil have been brought to grade, and immediately prior to dumping and spreading topsoil, loosen subgrade by discing or by scarifying to a depth of at least 2 inches to permit bonding of topsoil to subsoil. Compact by passing bulldozer up and down slope, tracking over entire surface area of slope to create horizontal erosion control slots.

E. No sod or seed shall be placed on soil which has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 DUST CONTROL

A. Implement dust control methods to control dust creation and movement on construction sites and roads and to prevent airborne sediment from reaching receiving streams or storm water conveyance systems, to reduce on-site and off-site damage, to prevent health hazards, and to improve traffic safety.

B. Control blowing dust by using one or more of following methods:

1. Mulches bound with chemical binders such as Carasol, Terratack, or equal.
2. Temporary vegetative cover.
3. Spray-on adhesives on mineral soils when not used by traffic.
4. Tillage to roughen surface and bring clods to surface.
5. Irrigation by water sprinkling.
6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.

C. Implement dust control methods immediately whenever dust can be observed blowing on project site.

3.4 KEEPING STREETS CLEAN

A. Keep streets clean of construction debris and mud carried by construction vehicles and equipment. If necessary, install stabilized construction exits at construction, staging, storage, and disposal areas. Vehicle/equipment wash area (stabilized with coarse aggregate) may be installed adjacent to stabilized construction exit, as needed. Release wash water into a drainage swale or inlet protected by erosion and sediment control measures. Construction exit specified in Section 01 57 13.02 - Stabilized Construction Access.

B. In addition to stabilized construction exits, shovel or sweep pavement to extent necessary to keep street clean. Water hosing or sweeping of debris and mud off of street into adjacent areas is not allowed.

3.5 EQUIPMENT MAINTENANCE AND REPAIR

A. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose. Locate areas so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed

directly into receiving streams or storm water conveyance systems. Provide these areas with adequate waste disposal receptacles for liquid as well as solid waste. Clean and inspect maintenance areas daily.

B. On construction site where designated equipment maintenance areas are not feasible, take precautions during each individual repair or maintenance operation to prevent potential pollutants from washing into streams or conveyance systems. Provide temporary waste disposal receptacles.

3.6 WASTE COLLECTION AND DISPOSAL

A. Formulate and implement a plan for collection and disposal of waste materials on construction site. In plan, designate locations for trash and waste receptacles and establish a collection schedule. Specify and carry out methods for ultimate disposal of waste in accordance with applicable local, state, and federal health and safety regulations. Make special provisions for collection and disposal of liquid wastes and toxic or hazardous materials.

B. Keep receptacles and waste collection areas neat and orderly to extent possible. Waste shall not be allowed to overflow its container or accumulate from day-to-day. Locate trash collection points where they shall least likely be affected by concentrated storm water runoff.

3.7 WASHING AREAS

A. Avoid washing concrete delivery trucks or dump trucks and other construction equipment at locations where runoff shall flow directly into a watercourse or storm water conveyance system. Designate special areas for washing vehicles. Locate these areas where wash water shall spread out and evaporate or infiltrate directly into ground, or where runoff can be collected in temporary holding or seepage basin. Beneath wash areas construct a gravel or rock base to minimize mud production.

3.8 STORAGE OF CONSTRUCTION MATERIALS AND CHEMICALS

A. Isolate sites where chemicals, cements, solvents, paints, or other potential water pollutants are stored in areas where they shall not cause runoff pollution.

B. Store toxic chemicals, materials, pesticides, paints, and acids in accordance with manufacturers' guidelines. Protect groundwater resources from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on areas where toxic liquids are to be opened and stored.

3.9 DEMOLITION AREAS

A. Demolition activities which create large amounts of dust with significant concentrations of heavy metals or other toxic pollutants shall use dust control techniques to limit transport of airborne pollutants. However, retain water or slurry used to control dust contaminated with heavy metals or toxic pollutants on site, and prevent runoff directly into watercourses or storm water conveyance systems. Carry out methods of ultimate disposal of these materials in

accordance with applicable local, state, and federal health and safety regulations.

3.10 SANITARY FACILITIES

A. Provide construction sites with adequate portable toilets for workers in accordance with applicable health regulations.

3.11 PESTICIDES

A. Use and store pesticides during construction in accordance with manufacturers' guidelines and with local, state, and federal regulations. Avoid overuse of pesticides which could produce contaminated runoff. Take great care to prevent accidental spillage. Never wash pesticide containers in or near flowing streams or storm water conveyance systems.

3.12 CONSTRUCTION METHODS

A. Provide fuel tank protection area and driveway as shown on Drawings.

B. Do not locate fueling area in or near channelized flow area or close to storm sewer conveyance system. Provide sufficient space to allow installation of other erosion and sediment controls to protect those areas.

C. Clear and grub fueling area to remove unsuitable materials. Place geotextile fabric as permeable separator to prevent mixing of coarse aggregate with underlying soil. Overlap fabric minimum of 6 inches. Place coarse aggregate on top of geotextile fabric to minimum depth of 8 inches.

D. Grade protection area and driveway to provide sufficient drainage away from stabilized areas. Use sandbags, gravel, boards, or similar methods to prevent sediment from entering public right-of-way, receiving stream or storm water conveyance system. Provide driveway to fuel tank area with minimum width of 15 feet for one-way traffic and 30 feet for two-way traffic.

E. Place aboveground storage tank on top of cast-in-place or pre-cast foundation. Base size and thickness of foundation on size and weight of tank to be used, with minimum thickness of 6 inches. Enclose concrete foundation by 5-inch by 5-inch concrete curb and extend minimum of 1 foot beyond tank and dispenser assemblies, so that leak and drip can be contained within concrete foundation.

F. Slope concrete foundation minimum of 1 percent toward 6-inch wide by 12-inch long by 4-inch deep sump pit. Install minimum of 2-inch pipe inside sump pit with valve on outside of curb to allow draining of concrete foundation.

G. Install portable concrete Jersey Barrier around concrete foundation. Provide minimum clearance of 2 feet from edge of foundation. In lieu of Jersey barrier, install 4-inch diameter steel pipe bollards around foundation. Bury bollards minimum of 3 feet deep, 3 feet above ground, and 4 feet on center, encased in 12-inch wide concrete foundation.

3.13 MAINTENANCE

A. Inspections shall be conducted by designated health and safety officer qualified to conduct health and safety inspections.

B. Inspect stabilized areas after every storm event and at least once a week. Provide periodic top dressing with additional coarse aggregate to maintain required depth. Repair and clean out damaged control measures used to trap sediment.

C. Inspect fuel tank foundation's bermed area after every storm event and at least once a week. Visually examine storm water contained in tank's bermed foundation area for oil sheen or other obvious indicators of storm water pollution. Properly dispose of storm water when pollutant is present. Record visual examination of storm water discharge in Report noting date and time of examination, name of examiner, observations of water quality, and volume of storm water discharged from bermed area. Keep Report with other storm water pollution control inspection reports on site, in readily accessible location.

3.14 TEMPORARY FUELING AREA CLOSURE

A. Dispose of temporary vehicle and equipment fueling area by removal of sediment and erosion controls properly off site. Owner's Representative will inspect top soils in fueling area and immediate vicinity for evidence of fuel leaks. If Owner's Representative determines that sufficient pollutants have been released, remove soil and properly dispose off site. Other remediation methods may be required.

END OF SECTION

SECTION 01 45 16.32

CONTRACTOR'S QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Measurement and Payment
2. Quality Assurance/Control of Installation
3. References
4. Manufacturer's Field Services and Reports

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality at no additional cost to the Owner.

B. Comply fully with manufacturers' installation instructions, including each step in sequence.

C. Request clarification Owner's Representative before proceeding when manufacturers' instructions conflict with Contract.

D. Comply with specified standards as minimum requirements for Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce specified level of workmanship.

1.5 REFERENCES

A. Obtain copies of standards and maintain at job site when required by individual Specification sections.

1.6 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual Specification sections or as required by Owner's Representative, provide material or product suppliers' or manufacturers' technical representative to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, operator training, test, adjust and balance of equipment as applicable and to initiate operation, as required. Conform to minimum time requirements for start-up operations and operator training when defined in Specification sections.

B. At Owner's Representative's request, submit qualifications of manufacturers' representative to Owner's Representative 15 days in advance of required representatives' services. Representative is subject to approval by Owner's Representative.

C. A manufacturers' representative is to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to a manufacturer's written instructions. Submit report within 14 days of observation to Owner's Representative for review.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Testing laboratory services
2. Requirements of this section apply to testing laboratories employed by the Contractor for approval of manufactured products, materials, including mix designs and quality control of materials
3. Requirements of this section also apply to testing laboratories employed by the Owner for approval of materials and the constructed Work on site.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project

1.3 QUALITY ASSURANCE

A. Reference Standards

1. ASTM C 1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
2. ASTM D 3666 – Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.
3. ASTM D 3740 – Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
4. ASTM E 329 – Standard Specification for Minimum Requirements for Agencies Engaged the Testing and/or Inspection of Materials Used in Construction.
5. ISO/IEC 17025 – General Requirements for the Competence of Calibration and Testing Laboratories.

1.4 RELATED REQUIREMENTS

A. To test products and materials and provide certifications as identified in Part 2

Products, in the individual Specification sections, the Contractor shall either

1. Select, employ and pay for services of an independent testing laboratory or laboratories, or
2. Cause its suppliers to perform required inspection and testing using an independent testing laboratory or a qualified in-house laboratory.

B. Owner's Representative may, at its option, observe or witness any and all testing of materials and products which are to be utilized in the construction of the Work as they are being tested by the Contractor's laboratories.

C. Owner will select, employ, and pay for services of an independent testing laboratory to perform inspection and testing identified in Part 3 of individual Specification sections.

D. Employ and pay for services of independent testing laboratory or laboratories to perform inspection and testing identified in Part 2 of individual Specification sections.

E. Employment of testing laboratory by Owner does not relieve the Contractor of obligation to perform the Work in accordance with requirements of Contract Documents.

F. Contract will schedule Owner's testing laboratory which will be monitored by the Owner's representative. Provide minimum 24 hour's notice of testing to testing laboratory to avoid delay of the Work.

1.5 QUALIFICATION OF LABORATORY

A. Meet laboratory qualification requirements of ASTM E 329 and applicable requirements of ASTM C 1077, ASTM D 3666, and ASTM D 3740.

B. Meet ISO/IEC 17025 conditions for accreditation by the American Association for Laboratory Accreditation (A2LA) in specific fields of testing required in individual Specification sections.

C. If laboratory subcontracts are part of testing services, such work will be placed with laboratory complying with requirements of this Section.

1.6 LABORATORY

A. Owner's testing laboratory will provide and distribute copies of laboratory reports to the distribution list provided by Owner's Representative at the preconstruction conference. Distribution will include download to the Owner's electronic document management system (Sharepoint) for the Project.

B. Keep one copy of each laboratory report at site field office for duration of project.

C. Contractor's testing laboratory will provide and distribute copies of laboratory test reports for materials to be incorporated into this Work to the distribution list provided by Owner's Representative at the preconstruction conference.

Distribution will include download to the Owners electronic document management system (Sharepoint) for the Project

D. Laboratories will email material supplier, Contractor, and Owner's Representative no later than close of business on working day following test completion and review, reports which indicate failing test results.

1.7 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge requirements of Contract.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume duties of Contractor or the Owner

D. Laboratory has no authority to stop the Work.

1.8 SUBMITTALS (NOT USED)

1.9 CONTRACTOR RESPONSIBILITIES

A. Provide safe access to the Work and to manufacturer's facilities for Owner's Representative, and for testing laboratory personnel.

B. Provide testing laboratory with copy of construction schedule and copy of each update to construction schedule.

C. Notify Owner's Representative and testing laboratory during normal working hours of the day previous to expected time for operations requiring inspection and testing services. When Contractor fails to make timely prior notification, then do not proceed with operations requiring inspection and testing services.

D. Notify Owner's Representative 24 hours in advance when Specification requires presence of Owner's Representative for sampling or testing.

E. Request and monitor testing as required to provide timely results and avoid delay to the Work. Where specified, provide samples to laboratory in sufficient time to allow required test to be performed in accordance with specified test methods before intended use of material.

F. Cooperate with laboratory personnel in collecting samples on site. Provide incidental labor and facilities for safe access to the Work to be tested; to obtain and handle samples at site or at source of products to be tested; and to facilitate tests and inspections including storage and curing of test samples.

G. Arrange with laboratory through testing laboratory representative. Payment for additional testing will be made in accordance with Document 00 72 00 - General Conditions of the Contract:

1. Retesting required for failed tests
2. Retesting for nonconforming Work
3. Additional sampling and tests requested beyond specified requirements
4. Insufficient notification of cancellation of tests for Work scheduled but not performed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONDUCTING TESTING

A. Conform laboratory sampling and testing specified in individual Specification sections to latest issues of ASTM standards, TxDOT methods, or other recognized test standards as approved by Owner's Representative.

B. Requirements of this section also apply to those tests for approval of materials, for mix designs and for quality control of materials as performed by employed testing laboratories.

END OF SECTION

SECTION 01 51 36.01

PROCEDURE FOR WATER VALVE ASSISTANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

Operation of valves. Owner employees will operate existing valves. Contractor's employees may operate new valves included in the Project prior to acceptance by the Owner.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item. Include the cost of valve operation and valve assistance in associated pay items.

1.3 PROCEDURE

A. Contractor to coordinate with Owner’s Representative for valve assistance.

1.4 SUBMITTALS

A. Submit request for work order planning meetings in accordance with Section 01 33 00 – Submittals.

1.5 CANCELLATION

A. The Owner may cancel a scheduled valve assistance appointment at no extra cost to either party. Cancellation may be caused by bad weather, preparation work taking longer than anticipated or unforeseen delays by one or more of the three parties.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 55 26

TRAFFIC CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes traffic control requirements for signs, signals, control devices, flares, lights, as well as construction parking control, English-speaking flagpersons, peace officers, designated haul routes and bridging of trenches and excavations.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.

2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for this item (including flagmen). Include the cost of traffic control and flagmen in associated pay items.

1.3 SUBMITTALS

A. Conform to requirements of Section 01 33 00 – Submittals.

B. Traffic control plan responsive to the current Texas Manual on Uniform Traffic Control Devices (TMUTCD) sealed by Registered Professional Engineer is incorporated into Drawings. If Contractor proposes to implement traffic control without modification to plan provided, submit a letter confirming decision. If Contractor proposes to implement traffic control different than plan provided, submit a traffic control plan in conformance with TMUTCD sealed by Registered Professional Engineer.

C. Submit copies of approved lane closure permits.

D. For both traffic control plan and flagperson use, submit Schedules of values within 30 days following notice to proceed. Refer to Section 01 29 73 – Schedule of Values.

E. Provide information and records regarding use of qualified flagmen to verify use of “peace officers” as flagmen in compliance with Contract and Texas law, including but not limited to, Article 4413 (29bb), commonly referred to as Private Investigators and Private Security Agencies Act, and Article 2.12, Texas Code of Criminal Procedure.

F. Provide information and records regarding use of qualified flagmen to verify Contractor’s use of “certified flagmen” as flagmen is in compliance with Contract.

1.4 FLAGMEN

A. Use flagmen, qualified as described under Paragraph 1.4.B, Uniformed Peace Officers, and Paragraph 1.4.C, Certified Flagmen, to control, regulate, and direct even flow and movement of vehicular and pedestrian traffic when construction operations encroach on public traffic lanes.

B. Uniformed Peace Officer: Individual who has full-time employment as peace officer and receives compensation as flagman for private employment as individual employee or independent contractor. Private employment may be either employee-employer relationship or on an individual basis. Flagman may not be in employ of another peace officer and may not be a reserve peace officer.

   1. Peace officer is defined as:

      a. Sheriffs and their deputies

      b. Constables and deputy constables

      c. Marshals or police officers of an incorporated city, town, or village

      d. As otherwise provided by Article 2.12, Texas Code of Criminal Procedure, as amended

   2. Individual who has full-time employment as a peace officer is one who is actively employed in a full-time capacity as a peace officer working, on average, a minimum of 32 paid hours per week, being paid a rate of pay not less than prevailing minimum hourly wage rate set by federal Wage and Hour Act and entitled to full benefits of participation in retirement plan, vacation, holidays, and insurance benefits. A reserve peace officer does not qualify, under this definition, as a peace officer.

C. Certified Flagman: Individual who receives compensation as flagman and meets the following qualifications and requirements:

   1. Formally trained and certified in traffic control procedures.

   2. Required to wear distinctive uniform, bright-colored vest, and be equipped with appropriate flagging and communication devices

   3. English speaking, with Spanish as advantageous, but not required, primary, or secondary language.

   4. Paid as Certified Flagman, equivalent to hourly wage rate set for Rough Carpenter under Specification Section 00 73 43 – Wage Scale for Construction.

   5. Required to carry proof of training/certification and photographic identification card issued by training institute to allow Owner's Representative to easily determine necessary full-time traffic control is actually provided when and where construction work encroaches upon traffic lanes.

PART 2 - PRODUCTS

2.1 SIGNS, SIGNALS, AND DEVICES

A. Comply with Texas State Manual on Uniform Traffic Control Devices.

B. Traffic Barriers, Cones and Drums, Flares and Lights: As approved by local jurisdictions.

PART 3 - EXECUTION

3.1 PUBLIC ROADS

A. Abide by laws and regulations of governing authorities when using public roads. If Work requires public roads be temporarily impeded or closed, obtain approvals from governing authorities and pay permits before starting any Work. Coordinate activities with Owner's Representative.

B. Maintain 10-foot-wide, all-weather lane adjacent to Work areas for use of emergency vehicles. Keep all-weather lane free of construction equipment and debris.

C. Cover or remove the permanent signs and construction signs that are incorrect or that do not apply to the current situation for a particular phase. Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

D. Place positive barriers to protect drop-off conditions greater than 1 FT within the clear zones that remain overnight.

E. Construction activities not to obstruct normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the Owner.

F. Maintain local driveway access to residential and commercial properties adjacent to Work areas at all times. Use all-weather materials as approved by Owner's Representative when maintaining temporary driveway access to commercial and residential driveways.

G. Cleanliness of Surrounding Streets: Keep streets used for entering and leaving job area free of excavated material, debris, and foreign material resulting from construction operations.

H. Provide Owner's Representative 1-week notice prior to implementing each approved traffic control phase.

I. Notify local schools, churches, bus lines, police department, commercial businesses, and fire department in writing of construction a minimum of 5 working days prior to beginning Work.

J. Remove existing signing and striping that are in conflict with construction activities or may cause driver confusion.

K. Provide safe access for pedestrians along major cross streets.

L. Alternate closures of cross streets so that two adjacent cross streets are not closed simultaneously.

M. Do not close more than two consecutive esplanade openings at a time without prior approval by Owner's Representative.

3.2 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, and access by emergency vehicles.

B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

C. Prevent parking on or adjacent to access roads or in non-designated areas.

3.3 FLARES AND LIGHTS

A. Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.4 HAUL ROUTES

A. Utilize haul routes designated by authorities or shown on Drawings for construction traffic.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.5 TRAFFIC SIGNS AND SIGNALS

A. Construct necessary traffic control devices for temporary signals including but not limited to loop detectors, traffic signal conduits, traffic signal wiring, and crosswalk signals required to complete Work. Notify, a minimum of 60 days in advance, the agency concerning control boxes and switchgear. The agency will perform service, programming, or adjustments, to signal boxes and switchgear should this work be required during construction.

B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations. Establish notices, signs, and traffic controls before moving into next phase of traffic control.

C. Relocate traffic signs and signals as Work progresses to maintain effective traffic control.

D. Unless otherwise approved by Owner's Representative, provide driveway signs with name of business that can be accessed from particular cross-over. Use two signs for each cross-over.

E. Replace existing traffic control devices in project area.

F. Owner's Representative may direct Contractor to make minor traffic control sign adjustments to eliminate driver confusion and maintain traffic safety during construction at no additional payment.

3.6 BRIDGING TRENCHES AND EXCAVATIONS

A. Whenever necessary, bridge trenches and excavation to permit an unobstructed flow of traffic. Provide steel plates that can be laid across construction areas and major drives of commercial businesses.

B. Secure bridging against displacement by using adjustable cleats, angles, bolts, or other devices whenever bridge is installed:

1. On existing bus route.
2. When more than 5 percent of daily traffic is comprised of commercial or truck traffic.
3. When more than two separate plates are used for bridge.
4. When bridge is to be used for more than 5 consecutive days.

C. Install bridging to operate with minimum noise.

D. Adequately shore trench or excavation to support bridge and traffic.

E. Extend steel plates used for bridging a minimum of 1 foot beyond edges of trench or excavation. Use temporary paving materials (premix) to feather edges of plates to minimize wheel impact on secured bridging.

F. Use steel plates of sufficient thickness to support H-20 loading, truck or lane, that produces maximum stress.

3.7 REMOVAL

A. Remove equipment and devices when no longer required.

B. Repair damage caused by installation.

C. Remove post settings to a depth of 2 feet.

3.8 TRAFFIC CONTROL, REGULATION, AND DIRECTION

A. Use flagmen to control, regulate, and direct even flow and movement of vehicular and pedestrian traffic including but not limited to the following conditions:

1. Where multi-lane vehicular traffic must be diverted into single lane vehicular traffic
2. Where vehicular traffic must change lanes abruptly
3. Where construction equipment must enter or cross vehicular traffic lanes and walks
4. Where construction equipment may intermittently encroach on vehicular traffic lanes and unprotected walks and crosswalks

5. Where traffic regulation is needed due to rerouting of vehicular traffic around Work site.
6. Other areas of Work where construction activities might affect public safety and convenience.

B. Use and maintain flagmen at points for periods of time as may be required to provide for public safety and convenience of travel.

C. Use of flagmen is for purpose of assisting in regulation of traffic flow and movement and does not relieve Contractor of full responsibility for taking other steps and providing other flaggers or personnel as Contractor may deem necessary to protect Work and public.

3.9 INSTALLATION STANDARDS

A. Work in other phases shall be permitted, provided 1) phases are not continuous to one work is being done in presently, 2) installation of utility occurs in only one phase. Keep work and operation in second phase to an absolute minimum. Perform work in no more than two phases at a time. Authorization to perform work in second phase shall not relieve any responsibility of completing backfilling and paving operations in accordance with Contract.

B. Place temporary pavement with a single lane closure, in accordance with TMUTCD.

C. Reinstall temporary and permanent pavement markings as directed by Owner's Representative. Alternative markings shall be considered when marking manufacturer's weather conditions cannot be met. These alternatives are to be submitted and approved by Owner's Representative prior to installation. No extra payment will be made for use of alternative markings.

3.10 MAINTENANCE OF EQUIPMENT AND MATERIAL

A. Designate individual to be responsible for maintenance of traffic handling around construction area. Individual must be accessible at all times to immediately correct any deficiencies in equipment and materials used to handle traffic including missing, damaged, or obscured signs, drums, barricades, or pavement markings. Give name, address, and telephone number of designated individual to Owner's Representative.

B. Make daily inspections of signs, barricades, drums, lamps, and temporary pavement markings to verify that these are visible, in good working order, and conform with traffic handling plans and directions of Owner's Representative. When not in compliance, immediately bring equipment and materials into compliance by replacement, repair, cleaning, relocation, and realignment.

C. Keep equipment and materials, especially signs and pavement markings, clean and free of dust, dirt, grime, oil, mud, or debris.

D. Owner's Representative shall decide if damaged or vandalized signs, drums, and barricades can be reused.

END OF SECTION

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SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for tree and plant protection.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unless a separate bid item has been established, no separate payment will be made for tree and plant protection specified herein. Include cost in price bid for related work items.

1.3 SUBMITTALS

A. Conform to requirements of Section 01 33 00 – Submittals.

B. Submit name and experience of qualified Arborist to Owner's Representative.

1.4 PROJECT CONDITIONS WHEN TREES AND PLANTS ARE IDENTIFIED TO REMAIN

A. Preserve and protect existing trees and plants from foliage, branch, trunk, or root damage that could result from construction operations when trees and plants are identified to remain.

B. Do not allow any vehicular traffic, construction equipment, parking of vehicles or stockpiling of excavated material or construction materials within protected tree root zone areas. Refer to Section 1.6 DEFINITIONS, for Dripline/Root Zone Area definition.

C. Prevent the following types of damage:

1. Compaction of root zone area by equipment, vehicles, foot traffic or materials storage.
2. Suffocating roots by placing soil in excess of three inches (3") within root zone areas, including placement of any select fill or soil with high clay content.
3. Trunk and limb damage resulting from contact with equipment and vehicles.
4. Poisoning by pouring solvents, fuel, and other injurious materials on or near root zone areas or in areas where such materials will leak or wash into root zone areas.

5. Changing soil pH within root zones by depositing concrete, powdered lime or other materials used to stabilize or dehydrate soils.
6. Cutting roots measuring one inch (1") in diameter and larger within protected areas unless required for root pruning.
7. Scorching of foliage, twigs and limbs caused by direct contact with expulsion of hot exhaust from equipment or vehicles.
8. Branch damage due to improper pruning or trimming.
9. Damage from permanently altering drainage patterns near root zones.
10. Trunk and branch damage resulting from nailing or bolting.

1.5 DAMAGE ASSESSMENT

A. When trees other than those designated for removal are destroyed or badly damaged as result of construction operations, remove and replace with same size, species, and variety up to and including 8 inches in trunk diameter. Any tree larger than 8 inches in diameter shall be replaced with 8-inch diameter tree of same species and variety and total contract amount shall be reduced by amount determined from following International Shade Tree Conference formula: 0.7854 x D2 x $38.00 where D is diameter in inches of tree or shrub trunk measured 12 inches above grade.

1.6 DEFINITIONS

A. Dripline/Root Zone Area - The ground area delineated by the branch spread of a single plant or group of plants. This area is considered the most critical area of roots and should be protected, excluding the area within the street located between curbs.

B. Zero Curb Cut - The process in which required street work is conducted without cutting or otherwise disturbing soil located immediately behind the existing curb.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Protection Fencing - Orange, plastic mesh fencing, four feet (4') in height with six feet (6') high steel T-bar posts. Set posts eighteen inches (18") into ground. Stretch fencing material taut prior to securing.

B. Fertilizer - A low salt, slow release fertilizer containing twenty-seven percent (27%) nitrogen, nine percent (9%) phosphorus and nine percent (9%) potassium (potash) or similar.

C. Plastic Vapor Barrier - Polyethylene sheeting at least 6-mil thickness and three feet width to prevent leaching of stabilized material into native soil.

D. Tree Replacements - Shall be as approved by Owner’s Representative as necessary.

PART 3 - EXECUTION

3.1 PROTECTION AND MAINTENANCE OF EXISTING TREES AND SHRUBS

A. Except for trees shown on Drawings or determined by Owner's Representative to be removed or relocated, trees within Project area are to remain in place, protected from damage and maintained by Contractor.

B. If required by the Project specifications, employ a qualified Arborist. The Arborist must be approved by Owner's Representative and shall have a minimum of 5 (five) years of experience in the field of tree protection.

C. Perform the following services as required by construction activities for trees that remain:

1. Trimming

   a. Trees shall be pruned in accordance ANSI A300 (Part 1) - 2001 Pruning Revision of ANSI A300-1995 Tree, Shrub and Other Woody Plant Maintenance - Standard Practices. Pruning shall be done by a professional arborist who has received training in proper pruning techniques.

   b. Pruning shall not alter the natural shape or character of the tree or leave holes in the canopy. Trees and shrubs should be pruned for balance as well as to maintain proper form and branching habit.

   c. Cut limbs at branch collar. No stubs should remain on trees. Branch cuts should not gouge outer layer of tree structure or trunk.

2. Root Pruning

   a. When excavating with equipment within the root zone area is unavoidable and roots cannot be preserved, root prune prior to excavation to minimize damage to the portion of the root system that will remain.

   b. Prune roots using a conventional trenching machine. Trench along the proposed edge of excavation limits to a depth of three feet (3'). Do not allow ripping of roots with a backhoe or other equipment.

   c. Following trenching with the machine, re-cut roots measuring one inch (1") in diameter and larger using appropriate sharpened, pruning shears or pruning saws to make a clean, smooth-cut surface. Cut roots flush with edge of soil to limit root exposure.

   d. Backfill trench in a manner that will not allow settling using clean, native soil.

3. Fertilizing and Watering

   a. Trees should be fertilized in accordance with the American National Standard for tree fertilization ANSI A300 (Part 2) - 1998 Tree, Shrub and Other Woody Plant Maintenance - Standard Practices (Fertilization).

b. Deep root fertilize all trees that have received disturbance or damage to their root zone area.

c. Fertilize entire root zone area within the dripline of the tree and continue ten feet (10') beyond the dripline.

d. Mixture shall be injected into the top ten inches (10") of soil, under pressure of one hundred and fifty pounds per square inch (150 psi) to two hundred pounds per square inch (200 psi). Mix and apply per product label instructions.

e. Inject one-half gallon (1/2) of solution at a depth of ten inches (10") on spacing of three feet (3') between injection points.

f. Fertilizer shall be mixed in a tank with mechanical agitation.

g. Fertilizer to be added to tank and mixed on site.

h. During periods of inadequate rainfall, water trees once weekly to saturate soil to a depth of six inches (6") to eight inches (8") within root zones. Allow soils to dry between watering. Do not allow soils to remain wet.

4. Water areas currently being served by private sprinkler systems to maintain health of existing landscapes if the affected systems are temporarily taken out of service due to construction activities.

5. Contractor's option with Owner's Representative's permission, shrubs to remain may be temporarily transplanted and returned to original positions under supervision of professional horticulturist.

3.2 PROTECTION

A. Construction Methods

1. General

a. Contractor shall attend a pre-construction meeting conducted by the Owner's Representative to review tree preservation requirements and sequence of services for the construction process.

b. Protect tree limbs, trunks and foliage from direct exposure to hot exhaust from equipment and vehicles by providing adequate exhaust pipe deflectors.

c. Cover exposed roots within 24 hours to reduce damage caused by desiccation. Roots may be covered with soil or mulch to help protect them from drying.

d. Protect root zone areas from damage that may result from soil compaction or from noxious materials in solution caused by run-off or spillage during mixing and placement of construction materials, or drainage from stored materials.

e. Minimize cut to two inches (2") below grade when installing silt fence within tree root zones or anchor base of fabric on grade using gravel or staples. Do not cut roots 1" in diameter or larger.

f. Site preparation work and/or construction work shall not begin in any area where tree preservation measures have not been completed and approved by the Owner's Representative.

2. Preparation

a. Contractor shall not allow any vehicular traffic, parking of vehicles or stockpiling of excavated material or construction material within the root zone area of trees to be preserved.

b. When access within protected root zone areas by equipment traffic or frequent foot traffic cannot be avoided, contact Owner's Representative for review prior to entrance. Place a three-quarter inch (3/4") thick layer of plywood on natural grade within root zones to minimize soil compaction. Overlap edges of plywood by six inches (6") to twelve inches (12") to ensure adequate coverage. This is not acceptable bridging for driving over exposed tree roots. Exposed roots should not be driven over.

c. Contractor shall notify Owner's Representative if existing tree locations differ from locations represented on construction drawings. The tree location and dripline/root zone area as observed in the field shall supersede that outlined on construction plans.

3. Tree Protection Fencing

a. Each tree located adjacent to proposed soil excavation shall be protected with a tree protection fence or as designated on the plans. Fence locations shall be approved by Owner's Representative.

b. Contractor shall not remove or relocate tree protection fencing and shall not operate within the limits shown without approval of the Owner's Representative.

c. Fences shall be placed in continuous alignment to protect a tree or group of trees.

d. Posts shall be installed on eight-foot (8') centers at eighteen inches (18") below grade. The fencing shall be continuous between posts, shall be pulled taut prior to securing to posts, and shall be firmly attached to the posts with a minimum of three (3) wire ties.

e. Place fencing in a manner that will not obstruct traffic site lines at curbs, intersections or driveways.

f. Fencing shall be removed only after all work within the immediate area is complete.

g. Contractor shall immediately repair fences if damage occurs at no additional charge to client.

4. Excavation within Root Zone Areas

   a. For excavation within root zone areas, where required for personal safety, provide excavation protection by using vertical-wall-shoring techniques at excavations to minimize excavation width. Do not bench cut or step cut edge where such techniques will encroach on root zone areas.

   b. If roots are encountered and must be severed, roots measuring one inch (1") in diameter and larger shall be cut using a sharpened pruning instrument to leave a smooth, clean-cut surface.

5. Zero Curb Cut and Vapor Barrier Installation

   a. Where existing curb is to be removed within tree root zone areas, do not disturb soil immediately back of curb. Do not allow forms and stakes to disturb roots.

   b. A vapor barrier shall be installed to provide a non-leaching barrier between any stabilized material and/or concrete and tree roots and soils.

   c. Vapor barrier shall be installed vertically to a depth of five inches (5") below limits of stabilized material. Vapor barrier to be extended ten inches (10") above natural grade and ten feet (10') beyond the dripline limits of the tree. Trim vertical vapor barrier to approximately one inch (1") above grade after installation of final grade.

6. Boring/Tunneling

   a. In areas indicated, bore under root systems of trees at a minimum depth of four feet (4') from the top of pipe to the soil surface at natural grade.

   b. Bore pits and receiving pits shall be located outside of protected root zone areas.

   c. Equipment and material shall be positioned outside of protected root zone areas. When access within protected root zone area by equipment traffic or frequent foot traffic cannot be avoided, place a three-quarter inch (3/4") thick layer of plywood on natural grade within root zones to minimize soil compaction, refer to Section 3. 2, A, 2.

7. Trunk Barricading

   a. Install trunk barricading to protect trees in close proximity of moving or mechanical equipment and construction work when work is required within the tree protection fencing as shown on the plans.

   b. Place trunk barricading around entire tree trunks to protect tree trunks located within five feet (5') of construction activities.

   c. Install 2x4's or 2x6's (5-foot to 6-foot lengths) spaced 3 inches (3") apart around the circumference of the tree trunk.

d. Tie in place with 9 to 12 gauge steel wire.

B. Sequence of Tree Protection and Services

1. Fertilize trees affected by construction between the months of October and May.
2. Prune/trim trees for clearance and safety.
3. Root Prune trees.
4. Place tree protection fence and trunk barricades to protect trees. Place fencing prior to any construction activities.
5. Remove tree protection upon completion of project.

C. Existing Stressed and Declining Trees

1. Prior to beginning the construction phase, trees located within the right-of-way should be reviewed and trees that appear to be stressed or declining in health should be documented. Immediately notify the Owner's Representative of any dead and dying trees.

D. Accidental Spills of Toxic Materials

1. Concrete, lime or other chemicals placed or accidentally spilled within root zone protection areas shall be completely removed. Contaminated soil shall be completely removed at the time of the spill and removed by hand shovel. Fresh soil shall be added as necessary to bring the soil level to that of natural grade.

3.3 MAINTENANCE OF NEWLY PLANTED TREES AND REPLANTED TREES

A. Show proof of capacity to water during dry periods.

B. Guarantee trees planted for this Project shall remain alive and healthy at least until end of 1-year warranty period.

1. Within 4 weeks notice from Owner's Representative, replace dead trees or trees that in opinion of Owner's Representative have become unhealthy, unsightly or have lost their natural shape as result of additional growth, improper pruning, maintenance or weather conditions.
2. When tree must be replaced, guarantee period begins on date of tree replacement, subject to Owner's Representative's inspection, for no less than 1 year.
3. Straighten leaning trees and bear entire cost.
4. Dispose of trees rejected by Owner's Representative and bear entire cost.

END OF SECTION

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SECTION 01 65 50

PRODUCT DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for product delivery, storage and handling.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 - General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No payment will be made to Contractor for equipment or materials not properly stored and insured or without approved Shop Drawings.

1. Previous payments for items will be deducted from subsequent progress estimate(s) if proper storage procedures are not observed.

B. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this payment.

1.3 SUBMITTALS

A. Provide Owner project Log Book.

1.4 TRANSPORTATION

A. Make arrangements for transportation, delivery, and handling of equipment and materials required for timely completion of Work.

B. Transport and handle products in accordance with instructions.

C. Consign and address shipping documents to proper party giving name of Project, street number, and city. Shipments shall be delivered to Contractor.

1.5 DELIVERY

A. Scheduling: Schedule delivery of products or equipment as required to allow timely inspection and installation, and to avoid prolonged storage, overburdening of limited storage space, conflicts with other contractors on site. Confirm availability of equipment and personnel for handling products prior to delivery.

B. Packaging: Deliver products or equipment in manufacturer's original unopened and unbroken cartons or other containers designed and constructed to protect the contents from physical or environmental damage.

C. Identification: Clearly and fully mark and identify as to manufacturer, item, and installation location.

D. Protection and Handling: Provide manufacturer's instructions for storage and handling.

PART 2 - PRODUCTS

A. Products: Means material, equipment, or systems forming Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of Work. Products may also include existing materials or components designated for reuse.

B. For material and equipment specifically indicated or specified to be reused in the work:

1. Use special care in removal, handling, storage and reinstallation, to assure proper function in completed work.

2. Arrange for transportation, storage and handling of products which require offsite storage, restoration or renovation. Pay all costs for such work.

C. When contract documents require that installation of work comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in installation, including two copies to Owner's Representative. Maintain one set of complete instructions at job site during installation until completion.

D. Provide equipment and components from fewest number of manufacturers as practical, in order to simplify spare parts inventory and allow for maximum interchangeability of components. For multiple components of same size, type, or application, use same make and model of component throughout Project.

PART 3 - EXECUTION

3.1 PROTECTION, STORAGE AND HANDLING

A. Protection:

1. Protect materials in accordance with manufacturer's recommendations and requirements of these Specifications.

   a. Store products or equipment in location to avoid loss or physical damage to items while in storage.

2. Protect equipment from exposure to elements and keep thoroughly dry.

3. When space heaters are provided in equipment, connect and operate heaters during storage until equipment is placed in service.

B. Storage:

1. Store materials in accordance with manufacturer's recommendations and requirements of these Specifications.

2. Make necessary provisions for safe storage of materials and equipment. Place loose soil materials, and materials to be incorporated into Work to

prevent damage to any part of Work or existing facilities and to maintain free access at all times to all parts of Work and to utility service company installations in vicinity of Work. Keep materials and equipment neatly and compactly stored in locations that will cause minimum inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants. Arrange storage to provide easy access for inspection.

3. Restrict storage to areas available on construction site for storage of material and equipment as shown on Drawings or approved by Owner's Representative.
4. Provide off-site storage and protection when on-site storage is not adequate. Provide addresses of and access to off-site storage locations for inspection by Owner's Representative.
5. Do not use lawns, grass plots, or other private property for storage purposes without written permission of owner or other person in possession or control of premises.
6. Store in manufacturers' unopened containers.
7. Neatly, safely, and compactly stack materials delivered and stored along line of Work to avoid inconvenience and damage to property owners and general public, and maintain at least 3 feet from fire hydrant. Keep public, private driveways, and street crossings open.
8. Repair or replace damaged lawns, sidewalks, streets, or other improvements to satisfaction of Owner's Representative. Total length which materials may be distributed along route of construction at one time is 1,000 linear feet, unless otherwise approved in writing by Owner's Representative.

C. Handling:

1. Handle materials in accordance with manufacturer's recommendations and requirements of these Specifications.
2. Coordinate off-loading of materials and equipment delivered to job site. If necessary to move stored materials and equipment during construction, relocate materials and equipment at no additional cost to Owner. Do not allow the off-loading of materials in those parking areas used for crew's personal vehicles.
3. Provide equipment and personnel necessary to handle products by methods to prevent damage to products or packaging.
4. Provide additional protection during handling as necessary to prevent breaking, scraping, marring, or otherwise damaging products or surrounding areas.
5. Handle products by methods to prevent over bending or over stressing.
6. Lift heavy components only at designated lifting points.

7. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.

3.2 STORAGE FACILITIES

A. Temporary Storage Building (if required):

1. Provide a weatherproof temporary storage building specifically for the purpose of providing for protection of products and equipment.
   a. Size building to accommodate anticipated storage items; however, not less than 6'x8'.
2. Equip building with lockable doors and lighting, and provide electrical service for equipment space heaters and heating or ventilation as necessary to provide storage environments acceptable to specified manufacturers.
3. Provide methods of storage of products and equipment off the ground.
4. Provide this structure within 20 days after Notice to Proceed.
   a. Locate building on-site where shown on the Drawings or in location approved by the Owner's Representative.
   b. Remove building from site prior to startup and demonstration period.

3.3 FIELD QUALITY CONTROL

A. Inspect Deliveries:

1. Inspect all products or equipment delivered to the site prior to unloading.
   a. Reject all products or equipment that are damaged, used, or in any other way unsatisfactory for use on Project.

B. Monitor Storage Area: Monitor storage area to ensure suitable temperature and moisture conditions are maintained as required by manufacturer or as appropriate for particular items.

END OF SECTION

SECTION 01 71 13

MOBILIZATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for mobilization.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Measurement for mobilization is on lump sum basis.

B. Mobilization payments will be included in periodic progress payment upon written application subject to following provisions:

1. Authorization for payment of 50 percent of Contract Price for mobilization will be made upon receipt and approval by Owner's Representative of the following items, as applicable:
   a. Schedule of Values submittal in accordance with Section 01 29 73 – Schedule of Values
   b. Safety Program/Plan submittal in accordance with the Trench Safety Program/Plan in accordance with Section 31 41 00 – Trench Safety System.
   c. Construction Schedule submittal in accordance with Section 01 32 16 – Construction Progress Schedule
   d. Preconstruction photographs in accordance with Section 01 32 36.01 – Project Photographs
   e. Control of groundwater and surface water plan in accordance with Section – 1 57 23.02 – Control of Ground Water and Surface Water, when required
2. Authorization for payment of remaining 50 percent of Contract Price for mobilization will be made upon completion of Work amounting to 5 percent of Contract Price less mobilization unit price.

C. Mobilization payments will be subject to retainage amounts stipulated in Specification Section 00 72 00 – General Conditions of the Contract.

D. A reduction of 10 percent of mobilization amount bid in Schedule for Unit Price Work will be applied to each Payment Application when Field Office is not properly maintained. Proper maintenance consists of operational plumbing and

sanitary facilities, adequate potable water supply, operational telephone and facsimile machine and functional temperature control.

1.3 SUBMITTALS (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 74 13

CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes intermediate and final cleaning of Work, not including special cleaning of closed systems specified elsewhere.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 STORAGE AND HANDLING

A. Store cleaning products and cleaning wastes in containers specifically designed for those materials.

1.5 SCHEDULING

A. Schedule cleaning operations so that dust and other contaminants disturbed by cleaning process will not fall on newly painted surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents:

1. Compatible with surface being cleaned.
2. New and uncontaminated.
3. For Manufactured Surfaces: Material recommended by manufacturer.

PART 3 - EXECUTION

3.1 CLEANING - GENERAL

A. Prevent accumulation of wastes that create hazardous conditions.

B. Conduct cleaning and disposal operations to comply with laws and safety orders of governing authorities.

C. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains or sewers.

D. Dispose of degradable debris at an approved solid waste disposal site.

E. Dispose of nondegradable debris at an approved solid waste disposal site or in an alternate manner approved by regulatory agencies.

F. Handle materials in a controlled manner with as few handlings as possible.

G. Do not drop or throw materials from heights greater than 4 FT or less than 4 FT if conditions warrant greater care.

H. On completion of work, leave area in a clean, natural looking condition.

1. Remove all signs of temporary construction and activities incidental to construction of required permanent Work.

I. Do not burn on-site.

3.2 INTERIOR CLEANING

A. Cleaning During Construction:

1. Keep work areas clean so as not to hinder health, safety or convenience of personnel in existing facility operations.
2. At maximum weekly intervals, dispose of waste materials, debris, and rubbish.
3. Vacuum clean interior areas when ready to receive finish painting.
   a. Continue vacuum cleaning on an as-needed basis, until Substantial Completion.

B. Final Cleaning:

1. Complete immediately prior to Demonstration Period.
2. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed surfaces.
3. Wipe all lighting fixture reflectors, lenses, lamps and trims clean.
4. Wash and shine glazing and mirrors.
5. Polish glossy surfaces to a clear shine.
6. Ventilating systems:
   a. Clean permanent filters and replace disposable filters if units were operated during construction.

b. Clean ducts, blowers and coils if units were operated without filters during construction.

7. Replace all burned out lamps.
8. Broom clean process area floors.
9. Mop office and control room floors.

3.3 EXTERIOR (SITE) CLEANING

A. Cleaning During Construction:

1. Construction debris:
   a. Confine in strategically located container(s):
      1) Cover to prevent blowing by wind.
      2) Store debris away from construction or operational activities.
      3) Haul from site minimum once a week.
   b. Remove from work area to container daily.
   c. Site clean-up prior to storm events. Thoroughly clean site of all loose or unsecured items which may become airborne or transported by flowing water during storm events.
2. Vegetation: Keep weeds and other vegetation trimmed to 3 IN maximum height.
   a. The use of chemical weed control substances should be avoided unless prior Owner approval is received.
3. Soils, sand, and gravel deposited on paved areas and walks:
   a. Remove as required to prevent muddy or dusty conditions.
   b. Do not flush into storm sewer system.

B. Final Cleaning:

1. Remove trash and debris containers from site.
   a. Repair areas disturbed by location of trash and debris containers to Owner's satisfaction including but not limited to re-seeding, sod placement, pavement repair, asphalt repair, sidewalk repair, and rut removal and/or fill placement.
2. Clean paved roadways.

3.4 FIELD QUALITY CONTROL

A. Immediately prior to Demonstration Period, conduct an inspection with Owner's Representative to verify condition of all work areas.

END OF SECTION

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SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for construction waste management and disposal.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.

2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment will be made for waste material disposal under this Section. Include payment in unit price for related sections.

1.3 SUBMITTALS

A. Conform to requirements of Section 01 33 00 – Submittals.

B. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances. Submit a copy of all disposal permits to the Owner's Representative.

C. Submit copy of written permission from property owner(s) outside limits of Project, with description of property, prior to disposal of excess material. Submit written and signed release from property owner upon completion of disposal work. Copies of the permission and release documents are to be submitted to the Owner's Representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SALVAGEABLE MATERIAL

A. Excavated Material: When indicated on Drawings, load, haul, and deposit excavated material at location or locations shown on Drawings outside limits of Project.

B. Other Salvageable Materials: Conform to requirements of individual Specification Sections.

C. Coordinate with the Owner's Representative the loading of salvageable material.

3.2 EXCESS MATERIAL

A. Remove and legally dispose of vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage from job site.

B. Excess soil may be deposited on private property outside the Project limits when written permission is obtained from property owner. See Paragraph 1.3C above.

C. Verify flood plain status of any proposed disposal site. Do not dispose of excavated materials in area designated as within 100-year Flood Hazard Area unless the proper permit has been obtained. Remove excess material placed in "100-year Flood Hazard Area" at no additional cost to the Owner.

D. Remove waste materials from site daily, in order to maintain site in neat and orderly condition, unless otherwise authorized by the Owner.

END OF SECTION

SECTION 01 74 23

RESTORATION OF SITE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the restoration of sites affected by Utility Work, Roadway Reconstruction or Widening, or Facilities Work. Section does not apply to roadway extension projects.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.
3. Section 02 41 13 13 – Removing Existing Pavements and Structures.
4. Section 31 21 33 – Trenching, Backfilling, and Compacting for Utilities.
5. Section 32 13 13 – Concrete Pavement, Curb, Sidewalks, and Steps.
6. Section 32 90 00 – Seeding, Sodding, and Landscaping.
7. Section 32 92 13 – Hydro-Mulching.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment is to be made for Restoration of Site. Include price for this item in associated items.

1.3 REFERENCES

A. ANSI Z60.1 – American Standard for Nursery Stock.

1.4 DEFINITIONS

A. Site Restoration is replacement or reconstruction of site improvements to rights-of-way, easements, public property, and private property that are affected or altered by construction operations, with improvements to restore to a condition which is equal to, or better than, that which existed prior to construction operations.

B. Site Improvement includes but is not limited to pavement, curb and gutter, esplanades, sidewalks, driveways, culverts, headwalls, mail boxes, lighting, signage, fences, lawns, irrigation systems, and landscaping.

C. Line Segment. Length of water line or sewer from center line to center line of manholes, in line junction structure and bends as designated on Drawings, and to end of stubs or termination of pipe.

D. Minimum Trench Width. Allowable trench width for corresponding pipe outside diameter as defined in Section 31 21 33 – Trenching, Backfilling, and Compacting for Utilities, unless otherwise indicated on the Drawings.

1.5 SUBMITTALS

A. Conform to requirements of Section 01 33 00 – Submittals.

B. Submit qualifications of nursery or landscaping firm to be used.

1.6 QUALITY ASSURANCE

A. Have trees, landscape shrubs, and plantings performed by qualified personnel.

1.7 SCHEDULING

A. After paving or utility work is completed on line segment and segment is submitted on monthly estimate for payment, complete site restoration for that segment in accordance with 3.1 of this Section, unless extended in writing by Owner's Representative.

B. For utility work requiring testing or post-installation TV inspection, completion of segment is not considered to include testing or TV inspection. Schedule for completion of site restoration is not determined by completion of testing or TV inspection.

1.8 WARRANTY

A. Provide 2-week warranty on plants and sod grasses that die due to shock or damage only.

B. Replace plants that fail during warranty period according to specifications governing original plants.

C. At the end of the warranty period, provide written notification to homeowner(s) stating the underlying property owner, advising that home owner is subsequently responsible for watering, maintaining replaced plants and grasses. Provide copy of notice to Owner's Representative. Notice to include date and time notice was provided, who provided the notice and how was delivered.

D. Damage caused by natural hazards including hail, high winds or storm is not covered by warranty.

E. Existing plant material required to be moved on site are covered under warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pavement, Sidewalks, and Driveways. Use materials as specified in Section 32 01 17 - Pavement Repair and Resurfacing and as shown on Drawings.

B. Seeding and Sodding.

1. Provide sod and mechanically seed as specified in Section 32 90 00 – Seeding, Sodding, and Landscaping. For areas to be seeded, conform to

2. Provide hydro-mulching/seeding in accordance with Section 32 92 13 – Hydro-Mulching.

C. Trees, Shrubs, and Plantings.

1. Provide trees, shrubs, and plants of quantity, size, genus, species, and variety of those being replaced and conforming to recommendations and requirements of ANSI Z60.1 and Section 32 90 00 – Seeding, Sodding and Landscaping.
2. Use balled-and-burlapped nursery stock for tree replacement.
3. Within availability of standard nursery stock, replace each removed tree with one of an equivalent species and size, but with not less than 2½-inch diameter trunk, as measured 1½ feet above natural ground.

PART 3 - EXECUTION

3.1 COORDINATION

A. For water main and sanitary sewer and roadway reconstruction and widening, construction cannot exceed site restoration by more than 50% of total Project length or 1,000 lineal feet, whichever is less., unless otherwise approved by the Owner's Representative. Site restoration must proceed continuously and be sequentially completed in order of work progress. When utility work and reconstruction or widening work occurs within same limits of right-of-way, utility installation cannot exceed pavement improvements by more than 1,000 linear feet, unless otherwise approved by the Owner's Representative. No intermediate areas can be skipped or left to be completed at a future date, unless otherwise approved by the Owner.

B. For water main and sanitary sewer construction, site restoration associated with wet connections, cut and plugs, salvaging of fire hydrants and sewer reconnections which needs to occur after line is tested, can be restored after 45 days provided site is restored immediately after accomplishing such work. Payment may be withheld for such wet connections, cut and plugs, salvaging of fire hydrants and sewer reconnection work until site restoration is complete.

C. Limit utility installation to maximum of two project site locations for projects involving multiple subdivisions or locations, unless otherwise approved by the Owner's Representative.

D. When roadway reconstruction and widening is being completed in phases, complete restoration of site in previous phase before continuing to next phase, unless otherwise approved by the Owner's Representative.

3.2 EXAMINATION

A. Construction Site Photographs. Document conditions on and adjacent to construction site with construction photographs as specified in Section 01 32 36.01 – Project Photographs.

B. Make photographs of all areas where construction operations will be conducted including driveways and sidewalks within or adjacent to Work area.

3.3 PREPARATION

A. Removing Pavements and Structures.

1. Remove minimum pavement, curb and gutter, and other structures as required to perform Work. Perform removals in accordance with Section 02 41 13 13 – Removing Existing Pavements and Structures.

2. Remove concrete and asphaltic concrete material using sawed joints in accordance with Section 32 13 13 – Concrete Pavement, Curb, Sidewalks, and Steps.

3. Remove curb and gutter a distance of 2 feet outside excavation, unless otherwise approved by the Owner's Representative.

B. Remove or relocate existing fencing, if required, for construction operations. Maintain integrity of private property owner's fencing if needed for protection of children, pets, or property. Notify Property owner and/or resident at least 72 hours in advance before removing fencing and coordinate security needs in accordance with Section 01 11 20 – Job Conditions.

3.4 INSTALLATION

A. Pavement, Sidewalk, and Driveway Restoration.

1. Replace pavement, curb and gutter, culverts, headwalls, sidewalks, and driveways removed or damaged as result of construction operations. Reconstruct in accordance with Section 32 01 17 – Pavement Repair and Resurfacing.

2. Where replacement sidewalks terminate at street curb radius, construct wheel chair ramp that meets current Texas Accessibility Standards.

B. Seeding and Sodding.

1. Clean up construction debris and level area with bank sand so that resulting surface of new grass matches level of existing grass and maintains pre-construction drainage patterns. Level minor ruts or depressions caused by construction operations where grass is still viable by filling with bank sand.

2. Restore previously existing turfed areas with sod and fertilize in accordance with Section 32 90 00 – Seeding, Sodding, and Landscaping. Sod to match existing turf.

3. Restore unpaved areas not requiring sodding with hydromulch methods conforming to Section 32 92 13 – Hydro-Mulching.

C. Trees, Shrubbery, and Plants.

1. Take extra care in removing and replanting trees, shrubbery, and plants. Remove trees, shrubbery, and plants, leaving soil around roots. Place trees, shrubbery, and plants outside of excavation area.

2. Replace in kind any trees, shrubbery, and plants removed or damaged by construction operations.
3. Have nursery or landscape firm make tree replacements using balled-and-burlapped nursery stock.

D. Fence Removal and Replacement.

1. Replace fencing removed or damaged to equal or better than what existed prior to construction, including concrete footings and mow strips. Provide new wood posts, top and bottom railing and panels. Metal fencing material not damaged by Work may be reused.
2. Remove and dispose of damaged or substandard material.

3.5 CLEANING

A. Remove debris and trash to maintain clean and orderly site as described in General Conditions and Section 01 74 19 – Construction Waste Management and Disposal.

3.6 MAINTENANCE

A. Maintain shrubs, plantings, sodded areas and seeded areas through warranty period.

B. Replace shrubs, plantings, and seeded or sodded areas that fail to become established through warranty period.

C. Maintain newly planted trees, shrubs, and plantings as follows:

1. Water as often as necessary to keep ground and backfill moist until plantings have become established.
2. Repair or replace bracing as necessary.
3. Prune as necessary.
4. Treat plants in accordance with approved methods of horticultural practices where insects or disease affect plants after planting.

D. Refer to Section 01 56 39 – Temporary Tree and Plant Protection, Section 32 92 13 – Hydro-Mulching and Section 32 90 00 – Seeding, Sodding, and Landscaping for additional maintenance requirements.

END OF SECTION

SECTION 01 77 19

CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for closeout of a construction project.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Introductory Information, Proposing Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. Unit Price. No separate payment will be made for this item. Include the cost in associated items for this project.

1.3 SUBMITTALS (NOT USED)

1.4 SUBSTANTIAL COMPLETION

A. Comply with Document 00 72 00 – General Conditions of the Contract regarding Substantial Completion when Contractor considers the Work, or portion thereof designated by Owner's Representative, to be substantially complete.

B. Insure the following items have been completed when included in the Work, prior to presenting a list of items to be inspected by Owner's Representative for issuance of a Certificate of Substantial Completion:

1. Cutting, plugging, and abandoning of water, wastewater, and storm sewer lines, as required by specifications for each item;
2. Construction of, and repairs to, pavement, driveways, sidewalks, culverts, headwalls and curbs and gutters;
3. Sodding and hydromulch seeding, unless waived by the Owner in writing;
4. General clean up including signage, lighting, pavement markings, transfer of services, successful testing and landscape;
5. Installation of all bid items included in Document 00 41 00.02 – Proposal Form and approved Contract Document changes.
6. Any additional requirements in Section 01 11 20 – Job Conditions.

C. Assist Owner's Representative with inspection of Contractor's list of items and complete or correct the items, including items added by Owner's Representative, within a time period of 30 days or as mutually agreed.

D. Should Owner's Representative's inspection show failure of Contractor to comply with substantial completion requirements, including those items in

Paragraph 1.2B of this specification, Contractor shall complete or correct the items, before requesting another inspection by Owner's Representative.

1.5 CLOSEOUT PROCEDURES

A. Comply with Document 00 72 00 – General Conditions of the Contract regarding Final Inspection and Final Payment when Work is complete and ready for Owner's Representative's final inspection.

B. Provide Project Record Documents in accordance with Section 01 78 39 – Project Record Documents.

C. Complete or correct items on punch list, with no new items added. Address new items during warranty period.

D. Owner will occupy portions of Work as specified in other Sections.

1.6 FINAL CLEANING

A. Execute final cleaning prior to Final Inspection.

B. For facilities, clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Clean equipment and fixtures to sanitary condition.

D. Clean or replace filters of operating equipment.

E. Clean debris from roofs, gutters, down spouts, and drainage systems.

F. Clean site; sweep paved areas, rake landscaped surfaces clean.

G. Remove waste and surplus materials, rubbish, and temporary construction facilities from site following final test of utilities and completion of Work.

1.7 ADJUSTING

A. Adjust operating equipment to ensure smooth and unhindered operation in accordance with manufacturer's written instructions. Value of this testing and adjusting is five (5) percent of Lump Sum Amount in Schedule of Values for item being tested.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit operations and maintenance data as noted in Section 01 33 00 – Submittals.

B. Five (5) percent of Lump Sum Amount of each piece of equipment as indicated in Schedule of Unit Price Work or Schedule of Values shall be paid after required O&M data submissions are received and approved by Owner's Representative.

1.9 WARRANTIES

A. Provide one original and two copies of each warranty from subcontractors, suppliers, and manufacturers.

B. Provide Table of Contents and assemble warranties in three-ring/D binder with durable plastic cover.

C. Submit warranties prior to final progress payment.

D. Warranties shall commence in accordance with requirements in Document 00 72 00 – General Conditionsof the Contract.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual Specification sections.

B. Deliver to location as directed by Owner's Representative; obtain receipt prior to final Payment Application.

1.11 TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR) INSPECTION

A. Contact TDLR's Houston Regional Office, 5425 Polk Street, Houston, Texas, 77023, telephone 713-924-6303, fax 713-921-3106, to schedule an inspection for ADA compliance prior to final completion.

B. Provide results of TDLR's inspection to Owner's Representative prior to final inspection.

1.12 FINAL PHOTOS

A. Provide per Specification Section 01 32 36.01 – Project Photographs.

1.13 PROJECT RECORD DOCUMENTS

A. Provide per Specification Section 01 78 39 – Project Record Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 78 23.13

OPERATIONS AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Measurement and Payment
2. Submittals
3. Equipment Operation and Maintenance Data

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MEASUREMENT AND PAYMENT

A. No separate payment for this item. Include payment for Operations and Maintenance Date in associated pay items.

1.3 SUBMITTALS

A. Conform to requirements of Section 01 33 00 – Submittals. Submit list of operation and maintenance manuals and parts manuals to be provided.

B. Submit documents, bound in 8½- x 11-inch text pages, three-ring/D binders with durable plastic covers.

C. Prepare binder covers with printed title “OPERATION AND MAINTENANCE INSTRUCTIONS,” title of project and subject matter of binder when multiple binders are required.

D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

E. Contents: Prepare Table of Contents for each volume, with each Product or system description identified.

1. Part 1: Directory, listing names, addresses, and telephone numbers of Owner, Owner’s Representative, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify following:

a. Significant design criteria

b. List of equipment

c. Parts list for each component

d. Operating instructions

e. Maintenance instructions for equipment and systems

f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents

3. Part 3: Project documents and certificates, including following:

a. Shop drawings and product data

b. Air and water balance reports

c. Certificates

d. Photocopies of warranties

F. Within 1 month prior to placing equipment or facility in service, submit one original and two copies of operation and maintenance manual and parts manual for review.

G. Submit one original and two copies of completed volumes in final form 10 days prior to final inspection. This will be returned after final inspection, with Owner's comments. Revise content of documents as required prior to final submittal.

H. Revise and resubmit final volumes within 10 days after final inspection.

1.4 EQUIPMENT OPERATION AND MAINTENANCE DATA

A. Furnish operation and maintenance manuals for equipment. Operation and maintenance manual must contain all information required for the Owner to operate, maintain, and repair equipment. Manual must be prepared by equipment manufacturer, furnished to Owner's Representative and, as minimum, contain following:

1. Equipment functions, normal operating characteristics and limiting conditions

2. Assembly, installation, alignment, adjustment, and checking instructions

3. Operating instructions for start-up, normal operation, regulation and control, normal shutdown and emergency shutdown

4. Lubrication and detailed maintenance instructions. Maintenance instructions are to include detailed drawings giving location of each maintainable part and lubrication point and detailed instructions on disassembly and reassembly of equipment

5. Troubleshooting guide

6. Complete spare parts list with predicted life of parts subject to wear, lists of spare parts recommended on hand for both initial start-up and for normal operating inventory, and local or nearest source of spare parts availability

7. Outline, cross-section, and assembly drawings; engineering data; wiring diagram
8. Test data and performance curves

B. Furnish parts manuals for equipment. Manual must be prepared by equipment manufacturers, furnished to Owner's Representative and, as minimum, contain following:

1. Detailed drawings giving location of each maintainable part
2. Complete spare parts list with predicted life of parts subject to wear, lists of spare parts recommended on hand for both initial start-up and for normal operating inventory, and local or nearest source of spare parts availability including local contact information.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Maintenance and Submittal.
2. Recording.
3. Submittals.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
2. Division 01 – General Requirements.

1.2 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain one record copy of documents at site in accordance with Document 00 72 00 – General Conditions of the Contract.

B. Store Record Documents and samples in field office when field office is required by Contract, or in secure location. Provide files, racks, and secure storage for Record Documents and samples.

C. Label each document “PROJECT RECORD” in neat, large, printed letters.

D. Maintain Record Documents in clean dry and legible condition. Do not use Record Documents for construction purposes.

E. Keep Record Documents and Samples available for inspection by Owner’s Representative.

F. Bring Record Drawings to progress review meetings for viewing by Owner’s Representative.

1.3 RECORDING

A. Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

B. Contract Drawings: Legibly mark each item to record actual construction, or “as built” conditions, including:

1. Measured depths of elements of foundation in relation to finish first floor datum.
2. Measured horizontal locations and elevations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Elevations of underground utilities referenced to bench mark utilized for Project.
4. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
5. Field changes of dimension and detail.
6. Modifications made by Change Order.
7. Details not on original Contract Drawings.
8. References to related shop drawings and modifications.

C. Maintain on site at all times an instrument for accurately measuring elevations. Survey every joint of water main at time of construction and record on drawings water main invert elevation, including elevation top of manway and centerline horizontal location relative to baseline.

D. Record information with red felt-tip marking pen on set of blue line opaque drawings.

E. Legibly mark Record Drawings to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by Change Order or Field Order.
3. Other matters not originally specified.

F. Legibly annotate shop drawings to record changes made after review.

1.4 SUBMITTALS

A. At Contract closeout, deliver Project Record Documents to Owner's Representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 02673

WATER WELL REHABILITATION WORK, MATERIALS AND PUMPING EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

This Section describes performing water well and pumping equipment rehabilitation or replacement work, materials, equipment and operations that are currently estimated to include The Woodlands Well Nos. 25 and 31.

In addition, this Section describes additional well and pump work, if needed and approved, for: performing water well and pumping equipment rehabilitation or replacement work, materials, equipment and operations for an unspecified production well; the lowering of the existing pump bowl in an unspecified production well; and the installation of temporary pumping equipment for emergency conditions in one or more unspecified production wells.

Water Well and Pumping Equipment Rehabilitation or Replacement and Pump Lowering

No catwalk or right-angle gear drive existing at either Water Well 25 or 31. For Wells 25 and 31, remove the well motor and turn over to the Owner. For both wells, inspect the existing discharge head, column assembly, pump bowl and other pumping equipment and prepare a written inspection report. Perform well video survey(s), as required. Install tank and piping to convey water away from the well during pumping and jetting operations. Wire brush the well screen sections. Jet out and remove fill material from the bottom of the well. If approved, perform acid chemical treatment of the well screen sections. Insert and agitate chlorine solution into the well screens and jet out and neutralize the chlorinated water from well. Sound the depth of the gravel pack outside the top of the blank liner (lap) section and add gravel pack material, if needed. Perform any additional water well rehabilitation and/or testing work that is approved. Furnish and install a refurbished or new permanent pump bowl, new or reusable column pipe assembly, existing or new discharge head, and other pumping equipment and accessories, as specified or approved. The pump bowls are anticipated to be lowered by 100 vertical feet, and therefore, additional length of column pipe assembly will be required. Make all of the well and pumping equipment operational. Install motor (supplied by Owner), and the Owner will perform motor electrical hook-up. Chlorinate the well and well pump; place the water well in service for public water supply use and perform field testing of the water well and pumping equipment to check

performance. All work, materials and equipment as specified within these CONTRACT Documents and specifications.

Installing Temporary Pumping Equipment in Well(s)

If needed and approved, furnish and install temporary pumping equipment in one or more production wells, as follows: remove the existing electric motor and provide the motor to the Owner; remove and inspect the existing discharge head, column assembly, pump bowl and other pumping equipment and prepare a written inspection report; perform a well video survey(s); furnish and install temporary Contractor pump equipment in one or more production wells; install the Owner's electric motor or a Contractor rental motor; make all of the well and pumping equipment operational; chlorinate the well and well pump; and place the water well in service for public water supply use. All work, materials and equipment as specified within these CONTRACT Documents and specifications.

It is not currently estimated that other major water well rehabilitation work will be performed for the production wells, except as outlined. However, additional well and pump rehabilitation work, if necessary and approved, also could include: development and testing of the water well with a test pump; and performing other water well, pump and/or motor rehabilitation work if necessary and approved.

Contractor shall respond promptly to the Owner's request for temporary pumping equipment. If required by Owner, Contractor shall mobilize a service rig, remove the Owner's existing pumping equipment, install the Contractor's temporary pump equipment and make the temporary equipment operational within five (5) days.

Owner shall have first claim to all pump and motor materials and equipment and specifically the existing electric motor and motor shaft and any existing oil pot reservoir or right-angle gear drive equipment that is replaced shall remain the property of the Owner and <u>is not</u> included in the salvage materials. Contractor shall remove and salvage the remaining materials and equipment that are not claimed by the Owner or reinstalled or replaced.

The actual work, materials and time required and sequence of work for the project could change based on the condition and operation of the Owner's production wells, the well supply versus the water demand, actual conditions of the well, pump and/or electric motor encountered, review of the well video survey(s) and reevaluation of the available information and work required once the project begins.

The specifications provide information, requirements and guidelines for work and materials that may or may not be performed or used during the project.

Base bid items and alternate bid items are listed in the Bid Form for the estimated well, pump and motor rehabilitation and other work, materials and time that are currently planned and items, work, materials and equipment that may or may not be used, performed or installed.

A DATA SHEET FOR THE WATER WELL, PUMP AND MOTOR MATERIALS AND EQUIPMENT (Data Sheet) for each well is located at the end of this Section and includes existing well, pump and motor data and current design estimates for the well and new pumping equipment.

The existing well construction and material settings sheet for The Woodlands Wells 25 and 31 is provided in Appendix A that follows this Section.

The well site address and Montgomery County Key Map location are as follows:

Well 25: 8581 Woodlands Parkway, The Woodlands, Texas,
Key Map 215 Z.

Well 31: 7508 Gosling Road, The Woodlands, Texas, Key Map 217 U.

Unspecified Wells: If needed and approved, well(s) to be named by Owner.

Each prospective CONTRACTOR is encouraged to visit the specified well site locations prior to the bid opening to observe each well site, ensure that they can perform the work outlined with their service rig(s) and equipment and have site-specific observations to prepare the related costs for the Bid Proposal.

Each prospective Contractor is required to submit a written Contractor Experience and Equipment Record to the Engineer prior to the bid opening.

Contacts: Engineer:
San Jacinto River Authority
Aaron Schindewolf, P.E.
281-367-9511 phone
281-362-4385 fax

Owner / Operator:
San Jacinto River Authority
Aaron Schindewolf, P.E.
281-367-9511 phone
281-362-4385 fax

1.02 RELATED REQUIREMENTS

No Related Technical Specifications for this Contract other than this Section 02673.

1.03 REFERENCES

The publications listed below form a part of this Specification to the extent referenced, the publications are referred to in the text by basic designation only. If there is a more recent version or edition of the reference standard, then the most recent version or edition shall apply.

AMERICAN PETROLEUM INSTITUTE (API)

API 5L	2012 Specification for Line Pipe

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A36/A36M	2012 Standard Specification for Carbon Structural Steel
ASTM A48/A48M	2012 Standard Specification for Gray Iron Castings
ASTM A53/A53M	2012 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A108	2013 Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished
ASTM A275/A275M	2013 Standard Test Practice for Magnetic Particle Examination of Steel Forgings
ASTM A276	2013 Standard Specification for Stainless Steel Bars and Shapes
ASTM A510	2013 Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
ASTM A519	2012 Standard Specification for Seamless Carbon and Alloy Steel Mechanical Tubing
ASTM A582/A582M	2012 Standard Specification for Free-Machining Stainless Steel Bars

ASTM B505/B505M	2014 Standard Specification for Copper Alloy Continuous Castings
ASTM B584	2014 Standard Specification for Copper Alloy Sand Castings for General Applications

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	2010 Structural Welding Code – Steel, includes Errata

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA A100	2006 Water Wells
AWWA E101	1988 Vertical Turbine Pumps - Line Shaft and Submersible Types
AWWA C206	2011 Field Welding of Steel Water Pipe

HYDRAULIC INSTITUTE (HI)

HI 1.1 - 1.5	1994 Centrifugal Pumps – Installation, Operation and Maintenance

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC. (IEEE)

IEEE Standard 841-2001	IEEE Standard for Petroleum and Chemical Industry – Severe Duty Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors – Up to and Including 370 kW (500 Hp) (latest edition thereto)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA Premium Efficiency Standard for New Electric Motor (latest edition thereto)

NSF INTERNATIONAL

Standard 61	2012 Drinking Water System Components Health Effects

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ)

2013 Rules and Regulations for Public Water Systems (or latest edition thereto)

TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR)

2014 Water Well Drillers and Water Well Pump Installers Rules (or latest edition thereto)

1.04 SUBMITTALS

Contractor shall submit the following required information.

A. Contractor Experience and Equipment Record:

Prior to or at the bid opening, each prospective water well Contractor is required to submit a written record to the Engineer documenting the required water well and pump rehabilitation experience and equipment and contacts for verification. For consideration, a prospective Contractor shall meet the requirements given in subsections 1.05 A., B., C., D. and E. in this Section.

Appendix B follows this Section and includes a copy of the Contractor Experience and Equipment Record that is required to be completed and submitted by each prospective water well Contractor. Contractor can provide the same required experience and equipment records and information in its own document, if desired.

The Owner reserves the right to reject a prospective Contractor based on review of the experience records, license records, company location, equipment records, the company's work history and other relevant company information.

B. Noise Control:

Prior to beginning work activities, the Contractor shall visit the known well site(s) and then submit a document for Engineer review that specifies the actions to be taken to minimize noise associated with Contractor work activities at each well site.

C. Daily and Work Status Reports:

During the time period of all Contractor work on-site, the Contractor shall submit two copies of each Contractor written daily report to the Engineer. The daily report shall include information documenting the Contractor personnel, time and each work activity or operation that is performed every day.

Contractor also shall provide verbal or written work status reports to Engineer each day that work is being performed on the water well or well site.

D. Well Video Surveys:

The Contractor shall furnish the Owner and Engineer with the original DVD and one (1) DVD copy and a written survey report for each well video survey inspection. Related specifications and requirements are listed in subsection 3.02 B. in the Section.

E. Report on Discharge Head, Pump and Column Pipe Assembly:

The Contractor shall inspect the existing discharge head, pump bowl, column pipe assembly and any other pumping equipment and provide a written report to the Owner and Engineer on the condition of the materials and equipment, a list of the materials and equipment that need to be replaced or reconditioned and the cause or causes of any failures or damage to the materials or equipment, if apparent. The equipment shall be made available for inspection by the Owner and Engineer. Related specifications and requirements are listed in subsections 2.02 B. 1 and 3.02 A. in this Section.

The Contractor is not required to inspect the existing electric motor at each well site. The Contractor shall provide the existing electric motor to the Owner and the existing electric motor shall remain the property of the Owner and <u>is not</u> included in the salvage materials for the existing pumping equipment or the salvage materials bid item for the existing pumping equipment for each well.

F. Mill Test Certificates:

If any new well casing, screen or blank liner is installed in the well, the Contractor shall submit copies of the mill test certificates written in English to the Engineer with casing and pipe material information including: the casing and pipe diameters and wall thickness(es), location(s) of the manufacturer and supplier, pipe yield strengths in psi. The mill test certificates and other specified information shall be reviewed prior to acceptance by the Owner.

G. New Internal Blank Liner and Screen:

If any new internal blank liner and screen are installed in the well, the Contractor shall submit a proposed layout sheet or diagram that shows the planned materials and settings for the new internal blank liner and screen sections to the Engineer for review. The Contractor shall obtain

approval of the materials, settings and screen manufacturer from the Engineer prior to ordering the internal blank liner and screen.

H. Gravel Pack:

If any new gravel pack material is installed in the well, the Contractor shall submit the following to the Engineer for review and approval prior to ordering the gravel pack: 1) a recent sieve analysis of a pit sample; 2) a small bagged sample of the proposed gravel pack and the Toxicity Characteristic Leaching Procedure (TCLP) test results for the gravel pack material; and 3) a certification from the gravel supplier stating that the gravel conforms to AWWA A100-06 or the most recent version.

I. Well Testing Data:

If any well testing operations with the Contractor test pump are performed, the Contractor shall submit testing data to the Engineer following completion of the testing that includes the well pumping rate/s, static and pumping water levels and suspended solids (sand) measurement.

J. Pump Bowl:

1. Design Data:

The DATA SHEET FOR THE WATER WELL AND PUMPING MATERIALS AND EQUIPMENT (Data Sheet) at the end of this Section includes the estimated design data for the new permanent pump bowl including the design pumping rate, total dynamic head (TDH), pump setting and pump performance requirements. The Engineer shall review the data from any additional well testing that is performed and select the final design for the permanent pump bowl prior to the Contractor ordering the pump bowl.

2. Well Pump Bowl and Manufacturer's Data

a. Prior to ordering the pump bowl, the Contractor shall submit proposed manufacturer and pump bowl information and a copy of the pump performance curve for the proposed permanent pump to the Engineer for review and approval prior to final selection of the pump bowl, as specified in subsection 1.04. J.2. in this Section.

b. Pump Bowl Performance Data and Testing

Submit at least the following pump bowl performance data: Pump bowl performance curve with head-capacity data; and head, efficiency and brake horsepower versus flow capacity; operating speed; submergence required. Identify cut-off point, rated point, and minimum head at which pump operates without vibration and cavitation.

Perform a non-witness factory test of the new permanent pump bowl; factory test shall be performed by the pump manufacturer only to Acceptance Grade 1B standards. Submit the results of the non-witness factory test to the Owner and Engineer for review and approval prior to shipping the pump bowl to the Contractor.

c. Materials

Submit at least the following pumping equipment materials data: Total weight of well pump unit, including pump, column, head, drive and motor.

d. Prior to installing the pump bowl, the pump manufacturer shall submit a written record that documents that the pump was assembled by the pump manufacturer and the Contractor shall provide a copy of the written record to the Engineer.

e. Prior to completion of the project, the pump manufacturer shall submit written warranty information to the Contractor and the Contractor shall provide the same warranty information to the Owner and Engineer.

K. Pump Column Pipe Assembly Materials Sheets:

Prior to installation of the pump column pipe assembly, the Contractor shall submit copies of the materials sheets for the column pipe from the pipe supplier or other supplier/s to the Engineer.

L. Well, Pump, Motor and Vibration Testing and Report:

Following completion of the water well rehabilitation work and installation of the permanent pumping equipment, the Contractor shall provide a minimum 24-hour notice to the Owner and Engineer prior to the well, pump, motor and vibration testing by G-M Services. The Contractor shall submit two (2) copies of the G-M Services performance reports to the Engineer.

M. Fusion-Bonded Epoxy Coating:

If approved, approved fusion-bonded epoxy coating shall be applied to the pump bowl and/or specified section of the pump column pipe and oil tubing. Contractor shall submit information from the coating subcontractor on the type of fusion-bonded epoxy coating to be applied and the coating process to the Engineer for review and obtain approval of the fusion-bonded epoxy coating prior to coating the components as specified in subsection 2.02 E. 4. in this Section.

N. Zinc Anodes:

Owner shall decide if zinc anodes will be installed on the pump column pipe. Prior to installing the zinc anodes on the pump column pipe, the Contractor shall submit information on type of zinc anodes and obtain approval from the Owner and Engineer as specified in subsection 2.02 E. 5. in this Section.

O. Micarta System:

Owner shall decide if a Micarta system will be installed on the well. Prior to installing the Micarta system for the electric motor, the Contractor shall submit information on the components, installation method and the equipment to be isolated with the Micarta system and obtain approval from the Owner and Engineer as specified in subsection 2.02.E.6. in this Section.

Q. Disinfection Information:

Contractor shall submit well disinfection information including the type/s of disinfection and chlorination chemical/s to be used and include the Material Safety Data Sheet(s) (MSDS) for each chemical.

R. Bacteriological Sample Analyses:

The Owner will collect the required water samples and perform bacteriological analyses. The Contractor shall provide the Owner with recommendations for the duration of pumping prior to collection of the bacteriological samples (water samples for coliform analysis). Information and specifications for the well disinfection, bacteriological sampling and placing the well is service are in subsections 1.05 I. and 3.06 A. in this Section.

S. Shop Drawings:

1. Appurtenances for Pump/Well Operations

For items covered by this or another Technical Specifications Section, the Contractor shall submit manufacturer, model number, performance characteristics, and/or details of construction, as appropriate, or required by the Owner or Engineer.

T. Operation and Maintenance Data

Prepare and submit operation and maintenance data that include copies of material approved as shop drawings and other information relevant to operation and maintenance of the well and pump materials installed.

U. Well Rehabilitation and Equipment Report:

Following completion of the well rehabilitation and installation and testing of the new pumping equipment, Contractor shall prepare and submit to the Engineer three copies of a well rehabilitation and equipment report that includes information and descriptions for:

1. A summary of the rehabilitation work performed in chronological order with date/s and work description. Example: Date: remove and inspect pumping equipment, run well video survey, wire brush screens, jet out fill material, water well rehabilitation work, installation of new pumping equipment, testing of pumping equipment, etc.

2. Records and information for the new pumping equipment installed, including the pump bowl, column pipe assembly, electric motor and driver, and all other pertinent information for the pumping equipment.

3. Copies of all of the required submittals that are specified in subsections 1.04 in this Section and/or requested by the Owner or Engineer.

V. Painting

Submit products to be used for prime coat and finish coat in accordance with Section 3.07 of this specification.

1.05 QUALITY ASSURANCE

A. Well Contractor Record

Prior to or at the bid opening, each prospective water well Contractor shall submit a written record to the Engineer documenting the

requirements for water well and pump rehabilitation experience and equipment specified in subsections 1.05 A., B., C., D. and E. in this Section and include contacts for verification.

Appendix B includes a copy of the Contractor Experience and Equipment Record to be complete and submitted by each prospective water well Contractor. Contractor can provide the same required experience and equipment records and information in its own document, if desired.

The Owner reserves the right to reject a prospective Contractor based on review of the experience record, license record, company location, equipment record, the company's work history and other relevant company information.

B. Unit Coordination

The Contractor is responsible to ensure compatibility among all components of water well, including the well, well pump, motor, motor drive, right-angle gear drive and auxiliary engine assembly (if applicable) and accessories.

C. Well and Permanent Pump

Contractor shall comply with all applicable requirements of the Technical Specifications in this Section, the DATA SHEET FOR THE WATER WELL, PUMP AND MOTOR MATERIALS AND EQUIPMENT (Data Sheet) at the end of this Section and the other Contract documents.

Comply with applicable requirements of the TDLR, TCEQ, AWWA E101 and the Hydraulic Institute.

D. Permanent Pump Bowl

1. Design, construct, and test the permanent pump bowl as required in the Specifications in this Section and in accordance with the standards of the Hydraulic Institute.

2. The design, materials, and construction of the pump bowl and pumping unit installed in the well shall be that suitable for use for a municipal or public supply well application.

3. No pump bowl or pumping unit materials or construction used for an agriculture/irrigation well application will be allowed.

4. The pump bowl shall have a steep head-capacity curve and meet the pump performance requirements, including the design pumping rate, total dynamic head, minimum bowl efficiency and minimum pump head-capacity requirements listed in the DATA SHEET FOR THE WATER WELL AND PUMPING MATERIALS AND EQUIPMENT (Data Sheet) provided at the end of this Section.

5. Prior to ordering the pump bowl, the Contractor shall submit proposed manufacturer and pump bowl performance information and a copy of the performance test curve for the proposed permanent pump bowl to the Engineer for review and approval prior to final selection of the pump bowl, as specified in subsection 1.04 J. in this Section.

6. Pump bowl shall be assembled at the pump manufacturer's facility. Prior to installing the pump bowl, the pump manufacturer shall submit a written record to the Contractor and Engineer that documents that the pump was assembled by the pump manufacturer.

7. The pump bowl shall be constructed with stainless steel collets and bronze wear rings.

8. Prior to shipping the new permanent pump bowl, the pump manufacturer shall perform a non-witness factory test of the new pump bowl to Acceptance Grade 1B standards. Submit the results of the non-witness factory test to the Owner and Engineer for review and approval prior to shipping the bowl to the Contractor.

9. Prior to completion of the project, the pump manufacturer shall submit written warranty information to the Contractor, Owner and Engineer.

10. Well, pump, motor and vibration testing shall be performed by G-M Services following installation of the new well pump, pumping equipment and electric motor as specified in subsection 3.06 A.2.f. in this Section. No other testing services company is acceptable without written approval from the Owner or Engineer.

    The Contractor shall provide a minimum 24-hour notice to the Owner and Engineer prior to the well, pump, motor and vibration performance testing by G-M Services. Personnel with the Owner and/or Engineer shall witness the G-M Services performance testing.

E. Well Disinfection and Bacteriological Analyses

1. Contractor shall chlorinate and disinfect the well in accordance with AWWA A100 (latest edition).

2. Contractor shall completely flush the chlorinated water from the well. Contractor shall inform the Owner when the well and pumping equipment are operational, the well flushing is completed and the Owner can collect the bacteriological samples. The Contractor shall provide the Owner with recommendations for the duration of pumping prior to collection of the bacteriological samples (water samples for coliform analysis).

3. The Owner will collect the water samples and perform bacteriological analyses, in accordance with subsection 3.06 A. in this Section. It is not necessary for the Contractor to be present for the Owner to collect the water samples for bacteriological analyses but the Contractor can be present, if desired.

4. Related information and specifications for the well disinfection, bacteriological sampling and placing the well is service are in subsection 3.06 A. 2. in this Section.

1.06 OUTLINE OF WORK

The following general outline of the water well and pump rehabilitation work is the current estimated work that could be required for each individual well. The actual work, materials and time required and sequence of work for the project could change based on the actual conditions of the well, pump and/or motor encountered, review of the well video survey(s) and reevaluation of the available information and work required once the project begins.

The Contractor shall obtain approval from the Engineer prior to performing the actual well, pump and motor work and should not proceed to the next work item(s) without approval from the Engineer.

More detailed information, specifications and requirements for the well and pump rehabilitation, installation, testing and work and are given in subsections 3.02, 3.03, 3.04, 3.05 and 3.06 of this Section.

A Data Sheet for each specified or unspecified well is provided at the end of this Section. The existing well construction and material settings sheet for Well 3 is provided in Appendix A.

Water Well and Pumping Equipment Rehabilitation or Replacement

The Woodlands Well 25 - Estimated work for well rehab; if approved. This is not inclusive of any other site/utility work specified in the contract. The Contractor shall:

A. Mobilize and demobilize a service rig and all equipment, materials and personnel to and from well site, as needed to complete the required work at well site.

B. Remove the existing electric motor and turn over to the Owner.

C. Remove and inspect the existing discharge head, pump bowl, column pipe assembly and any other pumping equipment and materials. Prepare a written inspection report and provide the report to the Owner and Engineer for review. The Contractor shall make the pumping equipment available for inspection by the Owner and Engineer.

D. The Owner and Engineer shall review the Contractor's written inspection report and notify the Contractor of the quantities of existing column pipe, line shafting, oil tubing and other column assembly components that shall be replaced. The existing pump bowl shall be replaced with a new pump bowl or the existing pump bowl shall be refurbished, as directed by the Owner and Engineer.

E. If a new pump bowl is approved, the Engineer shall provide the final pump design conditions to the Contractor prior to ordering the new pump bowl. Provide pump submittal information for review and approval by Engineer and Owner. Pump shall meet the specifications on the Data Sheet and in this Section.

   If a new pump bowl is approved, order approved pump bowl, column assembly components and other pumping equipment. Pump manufacturer shall perform non-witness pump bowl test and provide testing data to Contractor, Engineer and Owner for review and approval prior to shipment.

G. Bail and dispose of oil from well prior to first well video survey.

H. Perform initial well video survey and any subsequent well video survey of the entire well, as needed, to check the condition of the well materials, including the surface casing, blank liner and screen sections,

the depth of the fill material in the well and the status or effectiveness of any prior well cleaning or work completed.

I. Furnish and install steel tank with overflow above the bottom of the tank to allow suspended solids during air lift jetting or pumping operations to settle out before discharge .

J. Wire brush all of the well screen sections.

K. Jet out and remove the fill material and sediment in the existing well screen and blank liner section(s) down to the total depth of the well.

L. Perform chemical treatment of the well. Insert and agitate acid solution into the well screen sections and jet out and neutralize the chemical solution from the well prior to discharge from the steel tank(s).

M. Insert and agitate chlorine solution into the well screens and jet out and neutralize the chlorinated water from well prior to discharge from the steel tank(s).

N. Sound the depth of the gravel pack outside the top of the blank liner (lap) section and add gravel pack material, if needed.

O. If approved by the Owner, perform any other approved water well rehabilitation work and/or testing that appears to be necessary based on the well video survey(s) or other information.

P. Furnish and install a new permanent pump bowl or the refurbished existing pump bowl, new or reusable column pipe assembly, existing or new fabricated steel discharge head, new airline, new PVC water-level measuring pipe, zinc anodes (optional), Micarta system (optional) and/or other approved equipment and accessories.

Q. Furnish and install the existing electric motor, a new electric motor or a rental motor, if approved, on the discharge head. Owner shall connect the electrical controls and wiring to the motor.

R. Restore pump, motor, controls and all well and pumping equipment to an “as found” or better condition and make all equipment operational.

S. Chlorinate the well pump and well and completely flush the well.

T. Owner shall collect water samples and perform bacteriological analyses.

U. Owner shall place the well in service.

V. Perform well, pump, motor and vibration testing by G-M Services.

W. Complete well site restoration and clean-up work and coordinate with the Owner to ensure that site conditions following completion of Contractor work are “as found” or better than those existing prior to initiating the rehabilitation work. Any on-site appurtenances, facilities or equipment damaged by the Contractor shall be repaired and replaced by the Contractor, at no cost to the Owner.

The Woodlands Well 31 - Estimated work for well rehab; if approved. This is not inclusive of any other site/utility work specified in the contract. The Contractor shall:

A. Mobilize and demobilize a service rig and all equipment, materials and personnel to and from well site, as needed to complete the required work at well site.

B. Remove the existing electric motor and turn over to the Owner.

C. Remove and inspect the existing discharge head, pump bowl, column pipe assembly and any other pumping equipment and materials. Prepare a written inspection report and provide the report to the Owner and Engineer for review. The Contractor shall make the pumping equipment available for inspection by the Owner and Engineer. It is not expected that the discharge head, pump bowl, column pipe assembly or any other pumping equipment and materials will require replacement if not noted on the proposal form.

D. Bail and dispose of oil from well prior to first well video survey.

E. Perform initial well video survey and any subsequent well video survey of the entire well, as needed, to check the condition of the well materials, including the surface casing, blank liner and screen sections, the depth of the fill material in the well and the status or effectiveness of any prior well cleaning or work completed.

F. Furnish and install steel tank with overflow above the bottom of the tank to allow suspended solids during air lift jetting or pumping operations to settle out before discharge .

G. Wire brush all of the well screen sections.

H. Jet out and remove the fill material and sediment in the existing well screen and blank liner section(s) down to the total depth of the well.

I. Perform chemical treatment of the well. Insert and agitate acid solution into the well screen sections and jet out and neutralize the chemical solution from the well prior to discharge from the steel tank(s).

J. Insert and agitate chlorine solution into the well screens and jet out and neutralize the chlorinated water from well prior to discharge from the steel tank(s).

K. Sound the depth of the gravel pack outside the top of the blank liner (lap) section and add gravel pack material, if needed.

L. If approved by the Owner, perform any other approved water well rehabilitation work and/or testing that appears to be necessary based on the well video survey(s) or other information.

M. Furnish and install a new permanent pump bowl or the refurbished existing pump bowl, new or reusable column pipe assembly, existing or new fabricated steel discharge head, new airline, new PVC water-level measuring pipe, zinc anodes (optional), Micarta system (optional) and/or other approved equipment and accessories.

N. Furnish and install the existing electric motor, a new electric motor or a rental motor, if approved, on the discharge head. Owner shall connect the electrical controls and wiring to the motor.

O. Restore pump, motor, controls and all well and pumping equipment to an “as found” or better condition and make all equipment operational.

P. Chlorinate the well pump and well and completely flush the well.

Q. Owner shall collect water samples and perform bacteriological analyses.

R. Owner shall place the well in service.

S. Perform well, pump, motor and vibration testing by G-M Services.

T. Complete well site restoration and clean-up work and coordinate with the Owner to ensure that site conditions following completion of Contractor work are “as found” or better than those existing prior to initiating the rehabilitation work. Any on-site appurtenances, facilities or equipment damaged by the Contractor shall be repaired and replaced by the Contractor, at no cost to the Owner.

The Woodlands Unspecified Well –
Estimated work; if approved, the Contractor shall:

A. Mobilize and demobilize a service rig and all equipment, materials and personnel to and from well site, as needed to complete the required work at well site. Note that the Contractor is required to respond promptly to the Owner's notification. If required by Owner, Contractor shall mobilize service rig on-site and complete work items A. – J. within five (5) days of notification.

B. If present, remove the existing cat walk from around the wellhead and reinstall the cat walk prior to completion of the project.

If present, remove the existing sound wall from around the wellhead and reinstall the sound wall prior to completion of the project.

If present, disconnect the auxiliary engine drive shaft to the right-angle gear box and move the drive components out of the working area. Remove and inspect the existing right-angle gear drive equipment, prepare a written inspection report and provide the report to the Owner and Engineer. Reconnect the auxiliary engine and right-angle gear drive equipment prior to completion of the project.

C. Remove the existing electric motor and provide motor to Owner.

D. Remove the existing discharge head, pump bowl, column pipe assembly and any other pumping equipment and materials.

E. Bail and dispose of oil from well prior to well video survey, if performed.

F. If approved, perform initial well video survey and any subsequent well video survey of the entire well, as needed, to check the condition of the well materials, including the surface casing, blank liner and screen sections, the depth of the fill material in the well and the status or effectiveness of any prior well cleaning or work completed.

G. Furnish, install, make operational and remove Contractor temporary pump equipment including: line shaft pump bowl with the specified minimum pumping rate, total dynamic head and maximum bowl diameter; specified length and diameters of pump column assembly components, airline and water-level measuring pipe; discharge head; and all other necessary pump equipment for full operation. Rent complete temporary pump equipment to Owner for approved number of weeks.

H. Install Owner's electric motor. Owner shall connect the electrical controls and wiring to the motor.

I. If needed and approved, furnish, install, make operational and remove Contractor temporary electric motor to drive Contractor's temporary pump equipment. Rent electric motor to Owner for approved number of weeks.

J. Chlorinate the well pump and well and completely flush the well.

K. Owner shall collect water samples and perform bacteriological analyses.

L. Owner shall place the well in service.

M. If approved, inspect the existing discharge head, pump bowl, column pipe assembly and any other pumping equipment and materials. Prepare a written inspection report and provide the report to the Owner and Engineer for review. The Contractor shall make the pumping equipment available for inspection by the Owner and Engineer.

N. The Owner and Engineer shall review the Contractor's written inspection report and notify the Contractor of the quantities of existing column pipe, line shafting, oil tubing and other column assembly components that shall be replaced. The existing pump bowl shall be replaced with a new pump bowl or the existing pump bowl shall be refurbished, as directed by the Owner and Engineer.

O. If a new pump bowl is approved, the Engineer shall provide the final pump design conditions to the Contractor prior to ordering the new pump bowl. Provide pump submittal information for review and approval by Engineer and Owner. Pump shall meet the specifications on the Data Sheet and in this Section.

If a new pump bowl, column assembly components and/or other pumping equipment are approved, order approved pump bowl, column assembly components and other pumping equipment. Pump manufacturer shall perform non-witness pump bowl test and provide testing data to Contractor, Engineer and Owner for review and approval prior to shipment.

P. If a new electric motor is required and approved, submit required information for the new electric motor to the Owner and Engineer for review and approval. Order approved electric motor.

Q. If present, Engineer shall notify the Contractor if the existing right-angle

gear drive unit shall be refurbished and reconditioned or replaced with a new combination right-angle gear drive. If a reconditioned right-angle gear drive is approved, the Contractor shall perform the specified reconditioning work. If a new combination right-angle gear drive is approved, the Contractor shall provide a submittal for approval and order the new gear drive, combination shaft and coupling with the approved horsepower rating and gear ratio.

R. Complete well site restoration and clean up work and coordinate with the Owner to ensure that site conditions following completion of Contractor work are “as found” or better than those existing prior to initiating the rehabilitation work. Any on-site appurtenances, facilities or equipment damaged by the Contractor shall be repaired and replaced by the Contractor, at no cost to the Owner.

PART 2 – PRODUCTS

2.01 MANUFACTURER(S)

Manufacturers of materials and equipment that shall or may be installed are referenced in this Section. Contractor shall submit required data and information for materials and equipment to the Engineer as specified in subsection 1.04 in this Section.

2.02 MATERIALS AND/OR EQUIPMENT

A. Well Materials:

The Data Sheet for the Water Well, Pump and Motor Materials and Equipment for each well is provided at the end of this Section. The existing well construction and material settings sheet and pumping equipment information for each well are provided in Appendix A.

1. Blank Liner and Screen (Internal Liner if necessary and installed):

a. Blank Liner

Blank liner type, diameter and wall thickness are specified within the Data Sheet and described below.

ASTM A53 or API-5L Grade B black carbon steel pipe, with plain ends beveled for welding. Threaded and coupled pipe or similar pipe shall not be acceptable.

The bottom end of the new internal liner shall be fitted with a constructed steel plate with a wall thickness of 0.250-inch to 0.375-inch.

Contractor shall submit mill test certificates for the pipe used for the blank liner and screen.

b. Screen

Well screen type, diameter and wall thickness and screen slot size are specified on the Data Sheet and described below.

Pipe Base Screen: Pipe size, continuous slot, wire-wrapped, pipe base screen as manufactured by Weatherford/Johnson Screen (formerly Houston Well Screen Co.), Alloy Machine Works, or approved equal. Diameter and material for pipe base screen to be the same as specified for blank liner. Pipe base perforations to be produced by machining approximately 0.5-inch-diameter drilled holes, arranged uniformly around the outer circumference of the pipe and located between the longitudinal spacer ribs of the wire wrap. Open area to be at least nineteen (19) percent of pipe base surface area. The screen jacket to be fabricated of wedge shaped cold rolled wire spirally wound around and contact welded to a circular array of longitudinal rods. Wire wrap and longitudinal rods to be ASTM A276, Type 304 stainless steel.

2. Gravel Pack

Gravel pack and materials are specified on the Data Sheet and described below.

Gravel for gravel pack to be in accordance with AWWA A100 from Carmeuse Industrial Sands (Brady, Texas plant), or Unimin Texas Company (Voca, Texas plant). Gravel supplier shall provide a recent sieve analysis of the gravel pack to be installed to the Contractor and Engineer prior to shipment.

Use well-washed, screened, rounded gravel with not more than 5 percent flat or elongated pieces free of dirt, clay, trash or other deleterious material. Crushed gravel is not acceptable.

The size and grading of gravel pack selected for installation in the well shall be based on review of the original mechanical sieve analysis of sand samples collected when the well was drilled and any sand samples from the discharging water and/or the fill material that is removed from the bottom of the well, if available. Contractor shall have standard sieve analyses performed of any available sand sample(s) to provide data for the Engineer and Contractor make a final selection of the gradation of the gravel pack to be installed.

3. Chlorine Disinfection Products

   a. Sodium Hypochlorite: Disinfect the well, gravel pack and/or well screens as specified in this Section or approved by the Engineer. Disinfect the well screens using liquid sodium hypochlorite with specifications as follows:

      Sodium Hypochlorite, NaOCl.5 H_2O solution, hypochlorite compound Dixichlor, clean liquid form, cold water soluble, straw colored, minimum twelve percent (12%) available chlorine, as produced by Dixie Chemical Company, or approved equal, available in fifty-five (55) gallon drums. The required dosage is listed on the Data Sheet at the end of this Section.

   b. For Sodium Hypochlorite, agitate the chlorine disinfection solution into each screen section for a minimum of one minute per foot of screen.

   c. Chlorine enhancer such as Layne's Oximate or Johnson Screens' NW-410.

   d. If Contractor plans to insert or inject any other disinfectant product into the well during this project, the Contractor shall submit a material safety data sheet(s) and any other relevant product technical information to the Owner and Engineer for review and approval IN WRITING prior to introducing the product into the well.

4. Chemical Cleaning Agent – Hydrochloric Acid

   a. Solution shall contain fifteen percent (15%) hydrogen chloride base inorganic acid (hydrochloric) complete with 1.5% QC-21 or NW-310 enhancer or approved equal and

a non-toxic completely biodegradable inhibitor Rhodine 103 for potable water wells and potable water.

b. Solution shall be produced and mixed offsite by diluting in potable water, concentrated hydrochloric acid solution.

c. Agents to be added to the solution:

(1) QC-21 or NW-310 enhancer in liquid form, or equal.

d. Each one-thousand gallon (1,000 gal.) volume of fifteen percent (15%) hydrochloric acid solution shall contain dissolved therein two (2) pounds of an organic, cationic, non-toxic, completely biodegradable, acid corrosion inhibitor compound Rhodine 103 (powder form), or approved equal.

e. The required dosage or volume of the cleaning agent per foot of well screen is listed on the Data Sheet at the end of this Section.

5. Chemical Cleaning Agent – Hydroxyacetic Acid

a. Solution shall be a seventy percent (70%) monobasic organic acid (hydroxyacetic) solution complete with a non-toxic completely biodegradable inhibitor for potable water wells.

b. Solution shall be produced offsite by dissolving pure acid crystals in potable water to obtain a seventy percent (70%) hydroxyacetic acid solution, in liquid form, as produced by E.I. Dupont De Nemours & Co., Inc., or approved equal.

c. Each one-thousand gallon (1,000 gals.) volume of seventy percent (70%) hydroxyacetic acid solution shall contain dissolved therein twenty-five pounds (25#) of organic, cationic, non-toxic, completely biodegradable acid corrosion inhibitor compound Aqua-Pure, in powder form, as produced by B. J. Titan Services, or approved equal.

d. The required dosage or volume of the cleaning agent per foot of well screen is listed on the Data Sheet at the end of this Section.

6. Chemical Mud Dispersant – Aqua-Clear PFD

   a. Solution shall be a concentrated liquid polymer dispersant, anionic polyacrylamide, called Aqua-Clear PFD, in liquid form, as produced by Baroid Industrial Drilling Products. The chemical is available in five (5) gallon and one (1) gallon containers.

   b. Product shall be ANSI/NSF Standard 60 certified.

   c. The required dosage or volume of the dispersant agent per volume of water is given on the Data Sheet and is equal to 1 gallon of the agent for every 500 gallons of water, which is 0.2 percent (0.2%) by volume.

      The estimated volume of water to be treated with the dispersant agent is equal to 1.5 times (1.5 x) the estimated volume of water in the screen section and underreamed hole outside the screen.

7. Chemical Mud Dispersant – Sodium Tripolyphosphate (STP), $Na_5\ P_3\ 0_{10}$. Technical grade, white free-flowing granular form, water soluble, low toxicity, minimum 85 percent $Na_5\ P_3\ 0_{10}$.

   Assume for estimating two (2) pounds of chemical per foot of screen.

8. Chemical Mud Dispersant – Sodium Acid Pyrophosphate (SAPP), $Na_2\ H_2\ P_2\ O_7$. Technical grade, white crystalline powder, water soluble, minimum 67 percent $P_2\ O_5$.

   Assume for estimating two (2) pounds of chemical per foot of screen.

B. Well Pump:

1. Inspection Report

   As specified in the Proposal and subsections 1.04 E., 1.06 and 3.02 A. in this Section, the Contractor shall inspect the existing pump bowl, column pipe, shafting, oil tubing, other pump components and/or the discharge head and provide a written report to the Owner and Engineer that provides information on the condition of the pumping equipment and materials and lists the equipment and materials that need to be replaced. The

pumping equipment shall be made available for inspection by the Owner and Engineer.

2. Pump Type

   Vertical turbine pump with enclosed line shaft, oil-lubricated construction. Pump bowl installed shall meet the requirements specified in subsections 1.04 J, 1.05 C, 1.05 D, 2.02 B. and 3.04 A. in this Section.

3. Pump Manufacturer

   Pumps complying with the Technical Specifications in this Section and manufactured by the following companies are acceptable for consideration by the Owner:
   Christensen, Floway Pumps, Flowserve, Goulds Pumps, National Pumps or American Turbine.

4. Pump Design, Performance Requirements and Testing

   Pump must meet or exceed the well pump design performance requirements given on the Data Sheet at the end of this Section, including the design pumping rate, total dynamic head (TDH), minimum pump efficiency at the design point, head-capacity requirement and the field testing specified in subsection 3.06 A.2 in this Section.

   A non-witness factory test of the pump bowl shall be performed by the pump manufacturer to Acceptance Grade 1B standards, as specified in subsections 1.04 J, 1.05 D. and 3.04 A. in this Section.

   The Contractor and pump manufacturer shall be aware that: meeting or exceeding the specified head-capacity design point of the new pump bowl following installation is very important; field testing of the well and pumping equipment will be performed following installation of the pumping equipment as specified in subsection 3.06 A. 2. in this Section; and the Owner may require that the new pump bowl be adequately repaired or replaced if the field testing indicates that the head-capacity field performance of the new pump bowl is not acceptable.

5. Bowls, Suction, and Discharge Pieces

   Gray cast iron, Class 30 standard. If the total dynamic head at the design point for the permanent pump bowl selected exceeds

the allowable pressure head for cast iron pump bowl stages, then one or more ductile iron pump bowl stages, Class 60, shall be furnished and installed. Ductile iron pump bowls shall be double-bolted. Fitted for accurate alignment. Contoured venturi-type suction nozzle. Fit suction, discharge, and bowls with ASTM B505 bronze bearings, bronze wear rings, and stainless steel lock collets.

6. Impellers

   Enclosed cast bronze, ASTM B584, hand filed, polished, and dynamically and hydraulically balanced. Fasten to shaft with tapered collets, ASTM A582/A582M type 303 or 316 stainless steel.

7. Impeller Shaft

   Stainless steel ASTM A276.

8. Bowl Bearings

   ASTM B505 Bronze

9. Suction Pipe and Cone Strainer

   Five feet of suction pipe, same size as pump suction fitting.

   Install cone strainer below suction pipe constructed with the following materials:

   The cone strainer shall be constructed of stainless steel.

C. Fabricated Steel Discharge Head (if Approved)

1. If approved, furnish a new fabricated steel discharge head. Design head to support the pump bowl, column pipe assembly, electric motor and maximum hydraulic thrust with a minimum reserve safety factor of 25 percent. If the unit weighs more than 28,000 pounds, add a steel lifting plate fitted with a steel base plate.

2. Each new fabricated steel discharge head shall have four lifting lugs installed on the discharge head to provide sufficient strength for installing and pulling the combined weight of the pump bowl and pump column assembly components for the proposed pump setting with a minimum reserve safety factor of 25 percent.

3. The sealed tension bearing at shaft shall provide for continuous oil lubrication of shaft bearing during pump operation. Head to have sufficient space so that coupling can be installed below motor and above the tube tension nut for easy motor removal.

4. The new discharge head shall be machined with the following openings: 1-1/2-inch top tapped for airline tubing, 2-1/2-inch top tapped for water-level measuring pipe, plus machined holes for any other accessories and water-tight seals and caps for the tubing, pipe and any other accessories. Holes in the discharge head also shall be provided for the anchor bolts set in the pump foundation.

5. If an existing discharge head is reused and does not have acceptable machined holes for the airline tubing, water-level measuring pipe and any other accessories required by the Owner, then the Contractor shall machine the required holes as directed by the Owner or Engineer; there is a corresponding bid item in the Bid Proposal.

6. If an existing discharge head is reused and does not have sufficient strength for the deeper pump setting, then, if approved by the Owner or Engineer, the following improvements to the existing discharge head shall be completed by the Contractor to increase the load capacity and strength of the existing discharge head: furnish and install a steel sole plate with a minimum thickness of 1-inch and an adjustable column adapter flange with lock ring, and add lifting lugs if needed to provide a total of 4 lifting lugs; there is a corresponding bid item in the Bid Proposal.

   It is recommended that the Contractor visit each well site prior to the bid opening to inspect the existing discharge head for each well. Contractor should contact SJRA (Owner) or the Engineer to coordinate the well site visits.

D. Discharge Column Assembly

1. Column Pipe

   ASTM A53 or API 5L, Grade “B” carbon steel pipe; screw coupled electric resistance welded (ERW) pipe. Each column pipe section shall be twenty (20) feet or ten (10) feet in length, as specified. The ends of each section to be faced parallel and machined with threads to permit ends to butt. Ten (10) inch diameter column pipe shall have a wall thickness of 0.365 inch

(Schedule 40). Eight (8) inch diameter column pipe shall have a wall thickness of 0.322 inch (Schedule 40).

2. Column Pipe Coupling

   ASTM A108, Grade 1020 carbon steel; threaded internally to permit near perfect alignment of adjoining pipe joints with joint ends butted.

3. Oil Tubing

   Schedule 80, ASTM A53, Type "E," Grade "B" carbon steel pipe; pipe shall be threaded internally, 5-foot maximum lengths, connected by ASTM B505 or ASTM B584 bronze bearings, grooved for oil passage; coat tubing threads with sealing compound prior to assembly; support in column with rubber spiders, at maximum 40-foot spacing.

4. Line Shaft

   ASTM A108, Grade 1045 carbon steel; extend through tension nut to coupling with headshaft. Line shaft to be ground and polished with accurately machined parallel ends in interchangeable five-foot, ten-foot, or twenty- foot lengths.

5. Line Shaft Couplings

   ASTM A108, Grade 1215 carbon steel, internally threaded to tighten for normal pump rotation.

6. Line Shaft Bearings

   660 bronze, Copper Development Association (CDA) number 932.

E. Accessories for Pumping Equipment

1. Oil Lubricator (if Approved)

   New three-gallon capacity reservoir with immersion heater and thermostat, filled as recommended by pump manufacturer; solenoid valve for automatic stop/start control of oil flow; flow-regulating valve with sight glass; piping bypass around solenoid

control valve with needle valve; immersion type heater with thermostat. Oil piping to be type K copper.

Mount reservoir securely on outside of pump head. Do not use motor mounting bolts. Unit to be fabricated to allow for a padlock.

Coordinate with Owner prior to installation to ensure installation meets Owner standards. All oil piping and fittings from lubricator to fabricated discharge head shall be 316 stainless steel. Fittings to be manufactured by Swagelock or preapproved equal. All tubing bends to be plumb and parallel/ perpendicular and accomplished by means of a tubing bender.

If the existing oil lubricator and reservoir is reused and refurbishing of the oil lubricator is approved, then the Contractor shall furnish and install a new lubrication kit for the existing equipment and there is a corresponding bid item in the Bid Proposal.

Any existing oil lubricator and reservoir that is replaced shall remain the property of the Owner and is not included in the salvage materials for the existing pumping equipment.

2. Airline - Water Level Monitoring System

   a. An airline with a pressure gauge mounted on discharge head shall be furnished and installed to allow water level measurements. Do not use motor mounting bolts.

   b. Air tubing to be 316 stainless steel tubing, 0.25-inch O.D., 0.035-inch wall thickness, exterior PVC coating, supplied in one continuous piece, Dekoron Type 1005 or approved equal.

   c. Pressure Gauge

      (1) Type: Direct reading water level gauge.

      (2) Construction:

         (a) Case: 316 Stainless steel.

         (b) Bourdon Tube: Phosphor bronze.

         (c) Movement: Brass.

         (d) Connection: Brass.

(e) Window: Glass.

(3) Requirements

(a) Stem mounted, lower connection.

(b) 4-1/2-inch dial with single scale in feet of water.

(c) Scale to be suitable for initial pumping level plus minimum 150-foot decline.

(d) Make: Ashcroft or approved equal.

d. Snifter valve to be Schraeder or Crane-Deming.

3. Water-Level Measuring Pipe

a. Water-level measuring pipe to be polyvinyl chloride (PVC) material (Schedule 40), diameter of 1-1/4 inches, with round holes or perforations drilled in the bottom 40-foot length of pipe.

b. PVC pipe to be strapped and secured to the pump column pipe with metal straps or brackets or other manner approved by Owner or Engineer.

4. Fusion-Bonded Epoxy Coating (if Approved)

a. Fusion-bonded epoxy coating for pump bowl, column pipe and oil tubing shall be 3M™ Scotchkote™ 134 fusion-bonded epoxy coating or approved equal.

Coating of pump bowl and pump column pipe to be for both inner and outer surfaces.

Coating of oil tubing to be for the outer surface only.

b. Contractor shall submit information from the coating subcontractor on the type of fusion-bonded epoxy coating and the coating process to the Engineer for review and approval prior to coating of the pump components. Subcontractor that performs coating process shall strictly adhere to the 3M™ Scotchkote™ specifications for handling, safety, coating application and curing.

c. Contractor and/or subcontractor shall repair all defects in the epoxy coating at the coating location and in the field

with the material(s) and method(s) of defect repair specified by 3M™.

5. Zinc Anodes (if Approved)

   a. If Owner approves the zinc anodes, then Contractor shall submit information and obtain approval from the Owner and Engineer for the zinc anodes, as specified in subsection 1.04 N. in this Section.

   b. New zinc anodes shall be ribbon-type zinc anodes, standard size 1/2-inch x 9/16-inch, 0.6 lb./ft, installed on exterior of pump column pipe. Any other type of zinc anodes must be approved by the Owner and Engineer.

   c. Install type, number, weight and location of zinc anodes approved by Owner and Engineer.

6. Micarta System (if Approved)

   a. If Owner approves the Micarta system, then Contractor shall submit information and obtain approval from the Owner and Engineer for the Micarta system, as specified in subsection 1.04 O. in this Section.

   b. Micarta system installed shall provide protection for five zones associated with junction box, the motor, discharge head and discharge piping downstream of the wellhead.

      (1) Zone 1 – Motor Coupling

      The motor coupling and its mounting bolts shall be isolated by utilizing an approximately 3/8-inch thick base plate made of a phenolic sheet material which is machined to fit between the motor coupling and the quill of the motor. Three phenolic tubes shall be machined and cut to fit inside holes drilled in the phenolic base plate, through the bolts holes of the motor coupling with approximately 1/8-inch protrusion. Phenolic flat washers shall be machined to fit over the tubes. These phenolic washers shall isolate the mounting bolts heads from the coupling. This system shall isolate both the coupling from the motor and it's bolts from the

coupling and the motor quill.

(2) Zone 2 – Junction Box

The motor junction box shall be isolated using the same method as the motor coupling, except a 1/8-inch phenolic sheet material shall be used to provide a barrier between the junction box and the motor. This sheeting shall be used in conjunction with the rubber gasket provided by the motor manufacturer to provide a waterproof seal. The junction box mounting bolts shall again be isolated to fit. This system shall isolate between the junction box and its mounting location only. No isolation is required between the two halves of the junction box.

(3) Zone 3 – Motor Base

The motor base also shall utilize a 1/8-inch thick phenolic sheet machined to match the motor base and/or discharge head motor base. Phenolic tubes and washers shall be machined to isolate the mounting bolts. In most cases, the motor washers are used on each bolt. In instances where one base is drilled and tapped only one washer is required. This system shall isolate the motor from the discharge head.

(4) Zone 4 – Discharge Flange

The discharge flange shall utilize a 1/8-inch phenolic sheet machined to match the flange pattern. The total number of phenolic tubes required shall be determined by the flange size, with the phenolic washers again isolating both the bolt head and it's nut. Some flanges are drilled and tapped, so in these cases only one washer shall be required. The phenolic flange shall be used in conjunction with two flange gaskets to provide a watertight seal to prevent water leakage. This system isolates the discharge head from the discharge piping.

(5) Zone 5 – Tension Bearing

In order to isolate the copper tubing which supplies lubricating oil from the oil reservoir to the oil tube shall have a 1/4-inch di-electric coupling with the use of a 1/4-inch nipple. The isolation coupling shall be threaded into the tension bearing and a compression fitting on the copper lubrication line shall be threaded to the opposing end of the isolation coupling. This system isolates the lubrication of the pumping equipment.

PART 3 - EXECUTION

3.01 PREPARATION

A. Well Site and Well Protection

1. Each prospective Contractor is encouraged to visit the well site location prior to the bid opening to observe the site conditions and ensure that they can perform the work outlined with their service rig and equipment.

2. Each prospective Contractor shall visit each site location prior to the bid opening to observe the well site and ensure that they can perform the work outlined with their service rig and equipment.

3. Contractor shall cover, secure and protect the open well during all phases of well, pump and motor rehabilitation work and pumping equipment installation to prevent possible introduction of foreign material into the well, prevent damage, vandalism or contamination of the well, well water or groundwater. If directed by the Owner, the Contractor shall adequately weld a steel cap on top of the surface casing prior to the installation of the permanent pumping equipment. The Contractor is responsible for any damage, vandalism or contamination of the well, well water or groundwater.

4. Contractor shall take necessary measures to protect the existing discharge piping, valves, well collection lines, appurtenances, facilities, equipment and utilities at each well site and the adjoining property during the well rehabilitation operations. All equipment that is required to be disassembled to remove the pumping equipment shall be neatly organized in a location acceptable to the Owner.

5. Contractor shall maintain the well site premises, materials, tools, well service rig and equipment to prevent or minimize contamination of the well site and property, water well, well water and groundwater.

6. Contractor shall furnish and use temporary, sanitary, sealed and leakproof toilet facilities for personnel at the well site during the work at the well site and follow all applicable TCEQ rules and regulations.

7. Contractor shall coordinate the well site restoration and clean up work with the Owner to ensure that site conditions following completion of Contractor work are “as found” or better than those existing prior to initiating the rehabilitation work. Additional requirements and specifications for the site restoration and clean-up are in subsection 3.05 B. in this Section.

8. Any appurtenances, facilities, equipment or utilities at the well site or the adjoining property that are damaged by the Contractor shall be repaired and replaced by the Contractor, at no cost to the Owner or adjoining property owner.

B. Storage, Discharge, Disposal and Treatment of Water, Wastes and Fluids

1. Contractor shall obtain any discharge or disposal permits required by local, state or federal agencies prior to the start of any discharge or disposal operations.

2. Contractor shall be responsible for disposing of all water, wastes, fluids, oil, acids and chemicals from the well or stored at the well site in accordance with all local, state and federal regulations.

3. Contractor shall provide portable steel tanks for temporary storage of water, mud, cuttings, solids and fluids. Use of earthen mud pits, dug pits or slush pits will not be permitted.

4. Contractor shall dispose of all wastes, solids and contaminants off the project site in a legal manner.

5. Contractor is responsible for providing all the hoses, pipes, valves and connections needed to convey the water from the well to a drain, sewer or other approved discharge point. Include the complete cost of storage tanks, hoses, pipes, valves and off-site disposal of water, fluids and wastes in the corresponding prices in the Bid Form.

6. Water that is clear or low in suspended solids, neutralized to a pH of six (6) or higher and has a chlorine residual of three (3) milligrams per liter (mg/L) or less can be disposed of into a nearby storm drain, storm sewer or other discharge point that is identified and approved by the Owner or Engineer.

7. Contractor shall provide treatment to all well water produced in the cleaning and rehabilitation operations to meet the definition of potable drinking water prior to discharging the water to the storm drain, storm sewer or other approved drainage point located at or near the well site. Contractor is responsible for materials, equipment, methods and treatment required to remove suspended sediment and materials in the water including drilling mud, silt, sand or other particles in the water including furnishing and using settling tanks, filter fabric fence, hay or straw, and other effective methods. Settled materials shall not be discharged to, pumped or drained into the storm drain, sewer or other approved drainage point.

8. Contractor shall neutralize any water, wastes, fluids, acids or chemicals used in the cleaning and rehabilitation operations to a pH of six (6) or higher and a chlorine residual of three (3) milligrams per liter (mg/L) or less prior to any discharge from the well site.

9. Contractor shall store all wastes, oil, chemicals, acids and fluids at the well site in leakproof containers or tanks and take precautions and provide adequate containment to prevent site contamination from spills and leaks.

10. If directed by the Owner or Engineer, the Contractor shall pressure wash the concrete driveway and/or pad at a well site to remove any staining or discoloration of the concrete that is due to the Contractor's work and operations at the well site.

C. Safety Equipment and Training

1. Contractor shall provide adequate safety equipment, including all hard hats, hard-toe shoes, gloves, safety glasses, ear protection and other appropriate safety equipment and training that are required for the work specified for all Contractor personnel, subcontractors and visitors. Contractor shall enforce use of the safety equipment by the Contractor personnel, subcontractors and visitors at all times on the job site. Contractor and subcontractors shall provide adequate safety training for work specified.

2. Contractor, subcontractors and visitors shall conform to all applicable rules and requirements, including but not limited to the Occupational Safety and Health Administration (OSHA), Texas Department of Licensing and Regulation (TDLR) and Texas Commission on Environmental Quality (TCEQ).

D. Water Supply

1. Owner shall provide water to the Contractor from an outlet at or within 500 feet of the well site or water plant site as follows:

   Well 3 – 2-inch water supply available on-site.

   Unspecified Wells – Water available at or within 500 feet of the well site.

   If needed, the Owner may decide to have the Contractor install a hot tap on the discharge piping for each well for the water supply and a corresponding bid item is included in the Bid proposal.

2. Contractor shall coordinate with Owner regarding the necessary connections for the water outlet. Contractor is responsible for providing all the hoses, pipes, valves, fittings and connections needed to convey the water from the outlet source to the well. Contractor shall install a back-flow preventer on the water line or another type of back-flow device, if approved by the Owner.

3. Contractor shall install a flowmeter with a totalizer on the water line and record the volume of water used for the project. The Contractor will not have to pay for the water as long as the water is not wasted.

3.02 WELL AND PUMP REHABILITATION WORK AND INSTALLATION

A. Removal and Inspection of Permanent Pumping Equipment

1. Electric Motor

   a. As specified and if not already completed, the Contractor shall remove the existing electric motor and provide the motor to the Owner.

      The existing electric motor and motor shaft for each well shall remain the property of the Owner and <u>is not</u> included in the salvage materials for the existing pumping equipment.

2. Pump Components

   a. As specified and if not already completed, the Contractor shall remove and inspect the existing pump components including the discharge head, pump bowl, column pipe, oil tubing, line shaft, bearings, couplings and any other related components. The pumping equipment shall be made available for inspection by the Owner and Engineer.

3. Written Inspection Report

   a. Contractor shall prepare a written inspection report to the Engineer on the condition of the existing discharge head, pump bowl, column pipe, oil tubing, line shaft, bearings, couplings and any other related pumping equipment components.

   b. The written report shall include information on the condition of the existing components and materials that need to be replaced, refurbished or reconditioned. The report shall include the estimated costs for any additional materials and/or time that are not covered in the Base Bid or Alternate Bid items.

   c. No written inspection report by Contractor is required for the existing electric motor, which shall remain the property of the Owner and is not included in the salvage materials.

B. Well Video Survey Inspection and Procedure

1. Contractor shall perform well video survey(s), as needed, for the project, including surveys that may be performed after the pumping equipment has been removed from the well, after the wire brushing of the well screens and the jetting out of the fill material are completed and at other times as approved by the Engineer.

2. For each well video survey, Contractor shall perform a color video survey of the entire depth of the completed well, or other depth approved by Engineer, to check the physical condition and depths of the well materials and whether any fillup or foreign substances are present that require removal from the well.

3. Video equipment to consist of a self-contained video camera and a monitoring unit connected by a coaxial cable. Video camera to be waterproof and small enough to ensure passage through the

liner and screen sections. Video camera unit to include two separate video cameras with two separate light sources in one camera assembly unit with one video camera having a downhole camera lens and the second separate video camera having a right-angle camera. Video camera unit must have capability for operator to select downhole or right-angle lens from the surface for on-demand use without pulling the video camera unit out of the well, installing a camera attachment for right-angle view inside the well and rerunning the video camera unit back in the well. A downhole video camera with mirrors or a mirror attachment is not acceptable for use. Downhole video camera should show a self-continuous, clear picture of entire inside periphery of casing, liner, and screen and right-angle video camera should show clear close-up picture of casing, liner and screen.

4. Record and furnish the Owner and Engineer with a continuous written record of the well video survey inspection that includes the original DVD and one (1) DVD copy.

5. During each well video survey inspection, maintain a written record that lists the exact depth/s and/or depth intervals of the surface casing, top of the blank liner (lap), each blank liner and screen section, static water level, gravel level and fillup in the bottom of the well. The written record also shall include notations regarding observations on the physical condition of the well materials and any structural damage or irregularities that are observed. The Contractor shall provide a written record for each well video survey to the Owner and Engineer.

6. Reference datum for all depths on the written report shall be the height of the top of the pump foundation above ground level. Take measurement readings from the top of the pump foundation by means of a meter device. Make measurement from an object a fixed distance in front of video camera positioned at exact location of screen or liner.

7. During the well video survey operation, the Owner or Engineer reserves the right to request pictures at designated intervals from the video monitor. Such pictures to be taken with a Polaroid oscilloscope film camera, a Bezel assemble and latching device or other acceptable video equipment. Oscilloscope video camera to have been modified to take pictures from the video monitor screen.

C. Cutting Off, Removal and Disposal of Blank Liner Lap Section and Removal of Gravel Pack

1. Contractor shall cut off and remove the specified length of the upper blank liner lap section utilizing and including all equipment, materials, personnel and methods designed specifically to achieve the operations described in subsection 3.02 C. of this Section.

2. The cutting off and removal of the upper blank liner lap section shall include all Contractor and/or subcontractor equipment, materials and personnel required to complete the entire cutting and removal of the blank liner pipe and gravel pack in the lap section in an acceptable manner utilizing the Contractor's service rig and/or a subcontractor's hydraulic casing jack assembly and equipment.

   The bid items include separate bid items if only a service rig is used (base bid item) or a hydraulic casing jack assembly (alternate bid item) is necessary to remove the upper blank liner lap section from the well.

3. The cutting operations in the well shall be performed utilizing rotary cutting tools (hydraulic or mechanical) that are attached to drill pipe that is suspended from the service rig traveling block. The Contractor has the option of performing one (1) or more cuts of the blank liner lap section but the Owner shall not be charged any additional cost if more than one (1) cut is required to complete the cutting and removal of the blank liner lap section.

4. Shot cutting of the blank liner lap section is not acceptable or allowed.

5. Removal of the blank liner lap section following the cutting operations shall be performed using a service rig with a minimum fifty (50) ton capacity.

6. Removal of the blank liner lap section following the cutting operations shall be performed using a hydraulic casing jack assembly if the total hook load registered on an accurate weight indicator exceeds ninety-two percent (92%) of the service rig hook load capacity or if the removal cannot be successfully accomplished with a service rig.

   If a hydraulic casing jack assembly and equipment are used, then the assembly shall have a minimum weight capacity of

250,000 pounds and shall include the coincidental use of the service rig to support, control and lay down the blank liner lap section that is removed from the well.

7. Removal of the blank liner lap section following the cutting operations shall include use of a rotary casing spear with rotary bumper subs that are attached to drill pipe.

8. Disposal of the blank liner lap section from the well site after the cutting and removal operations are completed is the responsibility of the Contractor and shall include cutting of the blank liner lap section into pieces that do not exceed twenty (20) feet in length and trucking of the blank liner lap section(s) from the well site.

9. The cutting, removal and disposal operations for the blank liner lap section also include: 1) the acceptable removal of all gravel pack materials from the depth interval inside the surface casing where the blank liner pipe was cut and removed including any scraping of the surface casing in this section; 2) the sounding and checking of the depth of the top of the gravel pack in the annulus between the surface casing and the top of the remaining blank liner lap section following the cutting and removal of the blank liner lap section; 3) sounding and checking the depth of the fill-up in the bottom of the well following the cutting and removal of the blank liner lap section; and 4) jetting out of the gravel pack material from the lap section that falls to the bottom of the well.

   The sounding of the depth of the top of the gravel pack and the fill-up in the bottom of the well shall be performed using steel pipe with an accurate pipe tally and/or an accurate wire line with the necessary weights and guide(s).

10. Specifications for the gravel pack sounding and installation are in subsection 3.02 L. in this Section.

D. Wire Brushing of Well Screens

1. A wire brush assembly mounted on drill pipe (not steel cable) and suspended from the rig traveling block shall be provided for mechanical cleaning of the well screen sections and blank liner. Drill pipe shall have a minimum diameter of four (4) inches, or steel line pipe with a minimum diameter of four (4) inches can be used, with line couplings and brush assembly.
2. Wire brush assembly shall consist of wire bristle fabricated brushes extending over at least a ten (10)-foot length of drill pipe

and shall have at least five (5) sets of steel bristles that will brush the entire interior circumference of each well screen section or blank liner section. The outer diameter of the wire brush shall be fabricated to suit the screen or blank liner diameter.

3. Contractor shall furnish and use a minimum of two (2) wire brushes to adequately clean the well screens. Contractor shall remove and inspect the first wire brush assembly after about one-half of the screens are brushed and replace the first wire brush assembly to ensure satisfactory cleaning of the well screens.

E. Well Sounding, Cleaning and Removal of Fill Material:

1. Contractor shall sound the depth of the fill-up material in the bottom of the well with drill pipe or another approved method or methods: 1) after the jetting of the fill materials is completed; 2) after the completion of any well testing operations with a test pump; and 3) at other times needed to check the depth of the fill material in the bottom of the well.

2. Use the approved sounding method or methods and the well video survey(s) to assess the depth of the final fill material in the bottom of the well.

3. Following the wire brushing of the well screens, any well testing operations with a test pump, and/or prior to the installation of the permanent pumping equipment, if there is more than five (5) feet of fill material above the back pressure valve or bull nose plug in the bottom of the well, the Contractor shall clean or jet out the fill material and resound the bottom of the well to insure that the fill material has been removed adequately prior to completion of the water well and pump work and/or the installation of any new internal blank liner and screen.

4. The Contractor shall clean the well and well screens of foreign substances including but not limited to: excess oil, grease, scum or debris on the water's surface or in the water within the well materials; excess mud, sand, silt, clay, sediment or other debris in the screen perforations; and fill material, sediment, debris or manmade materials in the bottom of the well.

5. If the well video survey, well sounding or other method shows the presence of unacceptable foreign substance or substances in the well, then the Contractor shall use approved methods to remove the substance/s and clean the well adequately, then

sound the well, perform a video survey and/or test the well water or materials to show the substance/s has been removed, all at Contractor expense.

F. Inserting and Agitating Chlorine Into Well Screens

1. Chlorine mixing operations shall include mixing tank, tools, pump, piping, equipment and all incidentals required to mix the chlorine disinfection product, dissolve the chemical in potable water, insert the chlorine solution downhole and disinfect the well screens.

2. The mixing tank shall be portable, fabricated of materials capable of handling caustic and highly corrosive chemicals, have a minimum capacity of one thousand (1,000) gallons and shall be equipped with paddles or recirculation mixing equipment for dissolving and mixing the solution components and sufficient hose, piping and fittings to transfer the chemical cleaning or treatment solution from the mixing tank to the drill pipe head. The mixing tank shall be provided with an engine-driven chemical pump capable of handling caustic and highly corrosive chemicals, have a minimum pumping capacity of up to eighty (80) gallons per minute (gpm) against a discharge head sufficient to insert the well cleaning or treatment solutions downhole through the drill pipe and double-disk surge block agitator into the well screen interval regardless of screen depth. The water supply line shall be equipped with a back flow preventer and have a 2-inch air gap above the top of the tank to prevent siphoning.

3. The chlorine disinfection product used shall be sodium hypochlorite, as specified in subsection 2.02 A. 3. of this Section.

4. The required dosage or volume of the chlorine disinfection product per foot of well screen is given on the Data Sheet at the end of this Section. More information on the chemical materials and required mixture are given in subsection 2.02 A.3. and the Data Sheet at the end of this Section.

5. Chlorine disinfection operations downhole shall be performed by injecting the proportional volume of the approved chlorine product down the well into adjoining sections of each screen interval. The chlorine solution shall be injected from the top to the bottom of the well screen through a double-disk surge block agitator attached to drill pipe. Immediately following the injection of the chlorine solution into a complete twenty (20)-foot screen

section, the Contractor shall vigorously agitate each screen section utilizing a double-disk surge block agitator starting at the bottom of the well and progressing upward. The surge block agitator shall be the type normally used to agitate large-capacity, multi-screen, gravel-packed wells, shall be constructed with two (2) surge blocks or packers, suitably sized for the respective well screen diameter and spaced approximately six (6) to ten (10) feet apart center to center, slotted or perforated between the surge blocks or packers with the bottom end plugged or capped. The surge block agitator shall be constructed and fabricated to permit agitation of a nominal five (5)-foot length of screen and shall be supported on minimum four (4)-inch diameter steel drill pipe or 4-inch diameter steel line pipe with an integral airline with a minimum diameter of one and one-quarter (1-1/4) inches.

6. A minimum of two (2) gallons of potable water shall be used to displace one (1) gallon of chlorine solution.

7. The agitation time on the same working day shall be a minimum of three (3) minutes per each foot of well screen. Each succeeding day of chlorine disinfection operations shall include re-agitation from the top well screen down and include all well screen sections injected with chlorine solution and agitated the previous day. The re-agitation time on the next working day shall be a minimum of two (2) minutes per each foot of well screen or a different time approved by the Engineer. The re-agitation work shall be completed prior to injecting chlorine solution on the new day.

G. Chemical Treatment of Well Screens (Acid Treatment)

1. Chemical mixing operations shall include mixing tank, tools, pump, piping, equipment and all incidentals required to mix the chemical cleaning agent, dissolve the chemical in potable water, insert the chemical solution downhole and chemically clean and treat the well screens for chemical and biological encrustation.

2. The mixing tank shall be portable, fabricated of materials capable of handling caustic and highly corrosive chemicals, have a minimum capacity of one thousand (1,000) gallons and shall be equipped with paddles or recirculation mixing equipment for dissolving and mixing the solution components and sufficient hose, piping and fittings to transfer the chemical cleaning or treatment solution from the mixing tank to the drill pipe head. The mixing tank shall be provided with an engine-driven chemical pump capable of handling caustic and highly corrosive

chemicals, have a minimum pumping capacity of up to eighty (80) gallons per minute (gpm) against a discharge head sufficient to insert the well cleaning or treatment solutions downhole through the drill pipe and double-disk surge block agitator into the well screen interval regardless of screen depth. The water supply line shall be equipped with a back flow preventer and have a 2-inch air gap above the top of the tank to prevent siphoning.

3. The required dosage or volume of the cleaning agent per foot of well screen is given on the Data Sheet at the end of this Section. More information on the chemical materials and required mixture are given in subsections 2.02 A.4. and 2.02 A.5. and the Data Sheet at the end of this Section.

4. The well screens, blank liner or surface casing shall be mechanically cleaned with a wire brush assembly prior to the chemical cleaning operations to loosen, break-up and remove the surface encrustation and enhance the effectiveness of the chemical cleaning solution.

5. Chemical cleaning operations downhole shall be performed by injecting the proportional volume of the approved chemical cleaning solution down the well into adjoining sections of each screen interval. The chemical cleaning solution shall be injected from the top to the bottom of the well screen through a double-disk surge block agitator attached to drill pipe. Immediately following the injection of the chemical cleaning solution into a complete twenty (20)-foot screen section, the Contractor shall vigorously agitate each screen section utilizing a double-disk surge block agitator starting at the bottom of the well and progressing upward. The surge block agitator shall be the type normally used to agitate large-capacity, multi-screen, gravel-packed wells, shall be constructed with two (2) surge blocks or packers, suitably sized for the respective well screen diameter and spaced approximately six (6) to ten (10) feet apart center to center, slotted or perforated between the surge blocks or packers with the bottom end plugged or capped. The surge block agitator shall be constructed and fabricated to permit agitation of a nominal five (5)-foot length of screen and shall be supported on minimum four (4)-inch diameter steel drill pipe or 4-inch diameter steel line pipe with an integral airline with a minimum diameter of one and one-quarter (1-1/4) inches.

6. A minimum of two (2) gallons of potable water shall be used to displace one (1) gallon of hydrochloric acid or hydroxyacetic acid cleaning solution.

7. The agitation time on the same working day shall be a minimum of three (3) minutes per each foot of well screen. Each succeeding day of chemical cleaning operations shall include re-agitation from the top well screen down and include all well screen sections injected with chemical cleaning solution and agitated the previous day. The re-agitation time on the next working day shall be a minimum of two (2) minutes per each foot of well screen or a different time approved by the Engineer. The re-agitation work shall be completed prior to injecting chemical cleaning solution on the new day.

H. Chemical Treatment of Well Screens (Mud Dispersant)

1. Chemical mixing operations shall include mixing tank, tools, pump, piping, equipment and all incidentals required to mix and dissolve the chemical mud dispersant agent in potable water, insert the chemical solution downhole and chemically treat the well screens for mud and sediment removal.

2. The mixing tank shall be portable, fabricated of materials capable of handling the chemical solution, have a minimum capacity of one thousand (1,000) gallons and shall be equipped with sufficient hose, piping and fittings to transfer the chemical solution from the mixing tank to the tremie pipe head. The mixing tank shall be provided with an engine-driven pump capable of handling the chemical solution, have a minimum pumping capacity of fifty (50) gallons per minute (gpm) against a discharge head sufficient to insert the well chemical solution downhole through the tremie pipe regardless of depth. The water supply line shall be equipped with a back flow preventer and have a 2-inch air gap above the top of the tank to prevent siphoning.

3. The required dosage or volume of the dispersant agent per volume of water is given on the Data Sheet at the end of this Section. More information on the chemical materials and required mixture are given in subsections 2.02 A.6., 2.02 A.7. and 2.02 A.8.in this Section and the Data Sheet at the end of this Section.

4. Chemical treatment operations downhole shall be performed by injecting the proportional volume of the approved chemical

solution down the well through the agitator at the depth intervals of each well screen. The chemical solution shall be injected by pumping the solution in the mixing tank down through the agitator from the top to the bottom of each well screen. Immediately following completion of the injection of the chemical solution into the well screens, the Contractor shall vigorously agitate each screen section utilizing a double-disk surge block agitator attached to drill pipe and starting at the bottom of the well and progressing upward. The surge block agitator shall be the type normally used to agitate large-capacity, multi-screen, gravel-packed wells, shall be constructed with two (2) surge blocks or packers, suitably sized for the respective well screen diameter and spaced approximately six (6) to ten (10) feet apart center to center, slotted or perforated between the surge blocks or packers with the bottom end plugged or capped. The surge block agitator shall be constructed and fabricated to permit agitation of a nominal five (5)-foot length of screen and shall be supported on minimum four (4)-inch diameter steel drill pipe or 4-inch diameter steel line pipe. An integral airline with a minimum diameter of one and one-quarter (1-1/4) inches shall be used when agitating and airlift pumping.

5. The agitation time on the same working day shall be a minimum of three (3) minutes per each foot of well screen. Each succeeding day of chemical treatment operations shall include re-agitation from the top well screen down and include all well screen sections injected with chemical solution and agitated the previous day. The re-agitation time on the next working day shall be a minimum of two (2) minutes per each foot of well screen or a different time approved by the Engineer. The re-agitation work shall be completed prior to injecting chemical cleaning solution on the new day.

I. Swaging of Surface Casing, Blank Liner or Screen (without a Well Patch)

1. Swaging the blank liner or screen shall be performed utilizing materials, equipment and methods designed specifically to achieve the operations herein described.

2. Swaging operations described in this section shall include all incidentals required to swage a rupture, deformation or restriction in a blank liner or screen of any size to its full open concentric diameter, if possible, as determined by the Engineer, without installing a well patch.

3. Swaging operations down hole shall be accomplished utilizing electro-hydraulic swage tools attached to tubing suspended from the service rig traveling block.

4. Swaging the blank liner or screen of a well includes checking the total depth for possible fill-up, after swaging operations are completed, with a wire line and necessary weight and/or guides.

J. Swaging and Installation of Well Patch

1. Swaging and installation of a patch in the blank liner or screen shall be performed utilizing materials, equipment and methods designed specifically to achieve the operations herein described.

2. Swaging and installation of a well patch described in this section shall include all incidentals required to locate and swage prior to patch placement and press out a patch of the respective size and materials to liner diameter, inside of the existing blank liner or screen of any size to cover a rupture hole or structural break.

3. Swaging and well patching operations downhole shall be accomplished utilizing electro-hydraulic swage tools attached to tubing suspended from the service rig traveling block.

4. Contractor shall note that there are separate bid items in the Bid Proposal for: 1) the first swaging and patching operation, including complete costs for all related mobilization, demobilization, equipment and personnel costs and charges; and 2) any subsequent swaging and patching operation/s performed during the same mobilization trip of the swage equipment and personnel, even if each trip requires more than one (1) day to complete the approved swaging and patching operation/s.

K. Blank Liner and Screen (Internal Liner) Installation

1. Prior to ordering the blank liner and screen, the Contractor shall provide and run a sizer dummy through the existing well screen and blank liner to determine if the proposed internal blank liner and screen will fit. The dummy shall be mounted on pipe and run through the well using steel pipe or tubing. The outside diameter of the approximately 30-foot to 40-foot long dummy shall be equivalent to the inside diameter of the screen. The cost of providing and running the dummy shall be included in the cost for furnishing and installing the internal blank liner and screen.

2. The Contractor shall measure the new blank liner and screen sections in the field prior to the start of the installation operations to check the material diameters, lengths and settings versus those agreed to by the Contractor and Engineer to ensure that the materials are correct as specified and the layout and order of the individual sections are in the correct order for installation.

   Any discrepancies noted by the Contractor or Engineer shall be corrected by the Contractor or the casing or screen supplier prior to the start of the internal liner installation.

3. New internal blank liner shall be installed to extend up to near the top of the existing blank liner. The actual depth, configuration and design of the top of the new internal blank liner is at the option of the Contractor, subject to approval of the Engineer.

4. A left-hand set nipple connecting the top of the new internal liner with the bottom end of the drill pipe shall be used to install the internal blank liner and screen. The new internal casing shall be installed so it remains in tension during the setting and graveling operations.

5. The Contractor shall measure the drill pipe prior to the start of the installation operations and maintain a drill pipe tally to assist in landing the new internal blank liner and screen at the correct depth.

6. Field welding of the new internal blank liner and screen by the Contractor shall be performed by certified welders utilizing materials, equipment and methods designed specifically to achieve the operations herein described. Welding shall be performed in accordance with American Welding Society Specifications with best practices in the construction of deep water wells. The field welding shall be inspected by representatives of the Engineer.

7. Steel guides or centralizers shall be installed on the new internal blank liner pipe. These guides shall be installed as follows:

   a. Guides shall be constructed of steel with a thickness of about 1/4-inch, a width of approximately 1-1/2 inches, a length of about 6 to 8 inches and fabricated in a half moon shape.

b. Install deepest guide five (5) feet above the bottom of the bottom blank liner pipe section.

c. Install remaining guides with a maximum spacing of sixty (60) feet apart.

d. Install uppermost guide near the top of the new blank liner pipe.

e. Install and securely weld three (3) guides to blank sections at each depth selected.

f. Do not weld guides onto the screen sections.

8. Following the landing of the internal blank liner and screen downhole, the hook load of the drill pipe and production casing shall be suspended on the drill pipe from the service rig platform.

L. Gravel Pack Sounding and Installation

1. Contractor shall sound the top of the existing gravel pack outside the existing blank liner lap section or an internal blank liner (if installed) using steel pipe with an accurate pipe tally or a wire line and weights. If the gravel level is more than ten (10) feet below the top of the existing lap, the Contractor shall use a tremie pipe and install the approved gravel pack to bring the gravel level up to about five (5) feet below the top of the lap and perform the work outlined in the remainder of subsection 3.02 L. of this Section that is applicable.

2. If new internal blank liner and screen sections are to be installed, then prior to the installation of the internal liner or the gravel pack installation work, the Contractor shall sound the gravel pack as outlined in the previous paragraph and perform the work outlined in the remainder of subsection 3.02 L. of this Section that is applicable.

3. Prior to installation of the gravel pack, the Contractor shall submit information to the Engineer regarding the planned gravel supplier and gradation to the Engineer for review and approval.

4. Contractor shall estimate the gravel volume needed for the graveling operations and discuss the estimated volume with the Engineer prior to the start of the graveling operation.

5. The Contractor shall fill the annular space between the top of the existing blank liner lap section and the existing surface casing or between the top of the new internal blank liner and screen and

the existing blank liner lap section with the approved gravel pack material.

6. The Contractor shall complete graveling the annulus to the specified depth and verify the graveling work, volume and depth with Engineer prior to stopping the graveling operation and removing the gravel line.

7. Contractor shall slowly install the gravel pack with a tremie pipe using the gravity feed method or a gravel pump. The tremie pipe that serves as the gravel line shall be steel pipe. Contractor to notify Engineer of the graveling method prior to start of the graveling operations.

8. Prior to the start of the graveling operations, a gravel line or tremie pipe shall be installed to a downhole position at or below the top of the existing production casing lap so the gravel pack can be installed in the annulus between the existing and new casings.

9. Contractor shall maintain a gravel line tally for the graveling operations including the lengths of the individual joints, the total length of the gravel line string and the joints pulled out as the graveling operation progresses and shall provide the information to the Engineer.

10. Contractor shall maintain a summary tally or table of: 1) the number of gravel sacks or supersacks on-site; 2) the volume of gravel used during the graveling operation by measuring the gravel volume installed during at least each 200 feet of filling; and 3) the depth soundings of the gravel fillup depth as the graveling proceeds using a wireline with a metal rod weight.

11. If the gravel line is set a substantial distance below the top of the existing blank liner (lap), the gravel line shall be gradually withdrawn as the gravel fills the annular space.

12. Contractor shall control the graveling operation to ensure no bridging of the gravel occurs in the annular space between the existing production casing and the new internal blank liner and screen. Contractor shall use methods acceptable to Engineer to ensure that bridging does not occur.

13. Additional gravel shall be added as necessary to have a level just below the top of the new internal blank liner.

14. The gravel pack shall be gravity-fed or pumped downhole at a low rate through the gravel line with potable water and disinfectant mixed with the gravel.

15. Disinfection of Gravel Pack: The gravel pack shall be disinfected using sodium hypochlorite as specified in subsection 2.02.A.3. of this Section and as follows:

    a. Mix liquid sodium hypochlorite with the gravel. This solution shall be mixed in the proportion of about one-half gallon sodium hypochlorite (minimum twelve percent (12%) chlorine by weight) per ton of gravel pack installed.

    b. The Contractor shall inform the Engineer of the type of disinfectant and the mixing ratio and obtain approval from the Engineer prior to the start of the gravel pack installation.

    c. The disinfection product used shall be mixed or drip-fed (liquid) into the gravel pack in the gravel hopper or gravel tremie pipe during the graveling operations to ensure a chlorine residual in the gravel pack as it is installed in the annulus.

    d. Following completion of gravel pack installation operations, the gravel line may be removed from the well.

15. Internal Screen and Blank Liner Development: Following installation of an internal screen and blank liner and completion of the gravel pack installation, the screen sections shall be developed by agitation and airlift pumping as described in subsection 3.03 in this Section. This well development work is a separate pay item.

3.03 WELL DEVELOPMENT AND TESTING

A. Development with Agitator and Airlift Pumping

1. The well development operations shall include agitating, swabbing and airlift pumping of the well screens to remove formation fines from the installed gravel pack, help slip, reorient and stabilize the gravel pack and improve the well specific capacity.

2. Contractor shall utilize a double disk agitator, attached to the drill pipe or tubing to develop the gravel pack and well. The double disk agitator shall include two packers, sized for the respective diameter of the new production casing, spaced about six (6) feet

center to center apart on a piece of drill pipe or tubing, slotted or perforated between the packers, with the bottom end plugged/capped.

3. Contractor shall disinfect the well and gravel pack during the development using the agitator by injecting sodium hypochlorite into the gravel pack through each screen section using the agitator. The disinfectant (sodium hypochlorite) shall be applied downhole at a rate per foot of screen that is specified in this Section, or proposed by the Contractor and acceptable to the Engineer.

4. The air-compressor required for airlift pumping operations shall be capable of producing a minimum of five hundred (500) cubic feet per minute (cfm) of air supply at a minimum operating pressure of two hundred fifty (250) pounds per square inch (psi). The development operations include insertion of an eductor pipe with integral (inside) airline downhole in the new internal liner down to the deepest screened section for performance of agitation and airlift pumping operations of individual screen sections.

5. The eductor pipe and inside airline pipe shall be a combination of steel drill pipe, line pipe or tubing with a steel pipe airline. The eductor pipe head shall be provided with air pressure hose fittings (minimum 350-psi) and include a discharge hose (minimum fifty (50) foot length). The discharge hose shall be sized to convey and confine the airlift pumping discharge to a portable steel tank.

6. A portable, steel tank shall be provided by the Contractor. Water from the airlift pumping operations shall be discharged into the steel tank with an overflow two (2) feet above the bottom of the tank and then conveyed using a hose or piping into a storm drain, sewer or other discharge point approved by the Owner or Engineer.

7. Contractor shall follow the specifications and requirements given in subsection 3.01 B. in this Section, regarding the storage, discharge, disposal and treatment of water, wastes, fluids, acids and chemicals.

8. The service rig shall be equipped with an air gauge, sized to monitor the air pressure on the air injection line to the eductor pipe head.

9. The gravel level shall be sounded during the well development operations with a wire-line and necessary weight and/or guides and any additional gravel added as necessary to maintain a level approximately five feet below the top of the new internal blank liner when the development operations are completed.

10. As part of the well development, the Owner may require that the well specific capacity be checked. This procedure will include the Contractor airlift pumping the well using the agitator assembly set just above the top of the 10-inch liner or 14-inch liner. The well shall be tested for two or more hours during which the pumping rate, pumping level and static water level shall be measured and recorded at 15 minute intervals.

11. After completing the well development with the agitator and airlift pumping, the Contractor shall sound the well for fill-up. Contractor shall remove all fill materials, gravel and/or sediment in excess of five (5) feet above the bottom of the bottom blank section of the new internal liner.

3.04 PERMANENT PUMP BOWL AND PUMPING EQUIPMENT

A. Permanent Pump Bowl Design and Testing

1. The preliminary design estimates for the permanent pump and pumping equipment for each well are given on the Data Sheet at the end of this Section.

2. The data collected during any approved well development pumping and testing operations will be used to evaluate the well's specific capacity and suspended solids content and assist in adjusting the pumping rate, total dynamic head and/or pump setting for the permanent pump, if necessary.

3. Engineer shall review the available data and provide the final design pumping rate and total dynamic head for the pump bowl and the pump setting for the permanent pump and column pipe assembly to the Contractor.

4. Owner, Engineer and Contractor shall agree on the pump bowl and final design pumping rate, total dynamic head and pump setting prior to the Contractor ordering the permanent pump bowl and pumping equipment.

5. A non-witness factory test of the pump bowl shall be performed by the pump manufacturer to Acceptance Grade 1B standards

and the results of the test submitted to the Contractor, Owner and Engineer for review and approval prior to shipping the bowl, as specified in subsections 1.04 J., 1.05 D. and 2.02 B. in this Section.

6. Field testing of the well and pumping equipment will be performed following installation of the pumping equipment as specified in subsection 3.06 A. 2. in this Section;

B. Well Pump and Pumping Equipment Installation

1. Store, assemble and install well pump, pumping equipment, pump components and electric motor in accordance with the manufacturers' written instructions by personnel with the water well Contractor with specific experience installing vertical turbine pumps and electric motors. If needed to complete the work, the Contractor shall have field representatives with the pump and/or motor manufacturer on-site during installation operations.

2. The well pump, pumping equipment and electric motor shall be installed by an operator that is currently licensed by the Texas Department of Licensing and Regulation (TDLR) as a pump installer.

3. The pump and motor shall be installed using lifting lugs, if provided or installed, and equipment shall be handled with sufficient care to prevent damage.

4. A qualified person shall make all adjustments to the pumping equipment and the Contractor shall have personnel with the pump and/or motor manufacturer and/or other qualified consultant or subcontractor on-site for the pumping equipment installation, start-up and/or testing, if needed or required, to ensure proper installation and operation of the equipment. The Contractor shall be responsible for the complete costs of any additional personnel that are needed or required to assist with the pumping equipment installation, start-up and/or testing operations.

5. The Contractor shall notify the Owner prior to start up of the well.

6. The Contractor shall not start the well without the Owner present. The Owner shall be present and supervise start-up of the pump and motor.

7. The permanent pumping equipment shall be placed in service and tested as specified in subsection 3.06 A. in this Section.

E. Refurbish and Rebuild Existing Pump Bowl (if Approved)

1. If approved, refurbish and rebuild the existing pump bowl including the following minimum work and materials: a new stainless steel pump bowl shaft, new bronze bearings including the suction bearing, tube adapter bearing and throttle bearing, new bronze bowl wear rings, turn impeller skirts to common dimension, and trim and rebalance impellers.

3.05 REPAIR/RESTORATION

A. Well Capping

1. The Contractor shall cap and adequately protect the well and well water during the well, pump and motor rehabilitation operations in a manner acceptable to the Owner and Engineer.

2. After testing operations and removal of the test pump are completed, the well shall be capped in a manner acceptable to the Owner and Engineer that shall protect the well and well water. Before capping, the well shall be sterilized by adding a minimum of twenty (20) pounds equivalent volume of liquid sodium hypochlorite.

B. Site Restoration and Clean-Up

1. Following completion of the well and pump rehabilitation work and installation and testing of the new permanent pump and pumping equipment, the Contractor shall restore and clean up the well site to conditions “as found” or better than those existing prior to initiating the rehabilitation work.

   Site restoration and clean-up shall be accomplished by filling and/or leveling ruts and depressions, removing and cleaning up all debris resulting from rehabilitation operations to facilitate mowing of the site and replacing or reseeding grass, if necessary.

2. Any appurtenances, facilities, equipment or utilities at the well site or the adjoining property that is damaged by the Contractor shall be repaired or replaced by the Contractor, at no cost to the Owner or the adjoining property owner.

3. If directed by the Owner or Engineer, the Contractor shall pressure wash the concrete driveway and/or pad at a well site to remove any staining or discoloration of the concrete that is due to the Contractor's work and operations at the well site.

3.06 FIELD QUALITY CONTROL

A. Placing Well in Service and Field Testing

1. Following satisfactory completion of any approved Contractor well rehabilitation work and/or well testing and installation of the new permanent pump and pumping equipment, Owner and Contractor shall place well in service with Contractor work as follows in subsection 3.06 A. of this Section.

2. As a minimum, the Contractor is required to perform the following tasks to place the well in service.

a. Restore all well, pump, motor, controls and other pumping equipment to an "as found" or better condition.

b. Owner shall complete the final electrical service connections to the existing, reconditioned or new electric motor.

c. Contractor shall make all pumping equipment operational.

d. Notify Owner at least twenty-four (24) hours prior to start up of well. The Contractor shall not start the well, pump or motor without the Owner present.

e. The Owner shall start up the well with the Contractor present and both shall check the well, pump and motor operation.

f. Unless otherwise specified for a new well pump bowl and if approved for an existing pump bowl, conduct well, pump, motor and vibration testing including a wire-to-water efficiency test and vibration test of the pumping unit, including verifying that the permanent pump meets the design pumping rate and total dynamic head requirements. Performance tests to be performed by G-M Services and test report to be provided to the Contractor and Engineer.

When vibration cannot be measured on the housing, vibration as measured on the shaft will be acceptable, providing that fact is recorded on the vibration testing report.

The maximum acceptable maximum vibration is 0.2-inch/second.

g. Contractor shall repair or replace any well, pump or motor component that does not perform up to or meet the design criteria and these specifications, including the field head-capacity performance of the permanent pump, all at Contractor expense.

h. Contractor shall disinfect the well in accordance with AWWA A100 (latest edition) until three (3) samples collected on successive days and analyzed by the Owner show that the water sample analyses are negative for coliform bacteria.

Contractor is responsible for all normal work, materials and costs for well disinfection and flushing operations that are required to obtain one (1) negative bacteriological sample analysis for each well with pump lowering work only performed and obtain three (3) consecutive negative bacteriological sample analyses for each well with well and pump rehabilitation work performed.

Requirements for storage, discharge, disposal and treatment of water, wastes and fluids are specified in subsection 3.01 B. in this Section.

i. Contractor shall completely flush the chlorinated water from the well and perform field checks of the pH and concentration of the chlorine residual of the discharging water. Water that is clear or low in suspended solids, neutralized to a pH of six (6) or higher and has a chlorine residual of three (3) milligrams per liter (mg/L) or less can be disposed of into a nearby storm drain, storm sewer or other discharge point that is identified and approved by the Owner or Engineer.

j. The Owner shall collect and submit samples for bacteriological analyses. It is not necessary for the Contractor to be present for the Owner to collect the water

samples for bacteriological analyses but the Contractor can be present, if desired.

The Owner shall collect and submit samples to a laboratory certified by the Texas Department of Health to perform bacteriological analysis for public drinking water supplies.

Prior to placing well in service, one (1) negative bacteriological sample analysis is required for each well with pump lowering work only performed and three (3) consecutive negative bacteriological sample analyses are required for each well with well and pump rehabilitation work performed.

3.07 PAINTING

A. Utilize this section for all new components to be painted (preparation and prime coat not required, unless not primed, is rusty, and/or is dirty). Do not paint an existing fully-body mag meter, galvanized components, or stainless steel components.

B. Preparation:

1. Surface preparation shall be in accordance with the standards of the Society of Protective Coatings (SSPC).

2. Remove grease, oil, heavy chalk, dirt, or other contaminants by solvent or detergent and allow to fully dry.

3. Smooth, hard, or glassy finishes shall be scarified by sanding to create a surface profile.

4. Contain all chips and particulates removed from surfaces cleaned to the area of work, including prevention of particles being driven by wind or washed into drainage with water. Collect all chips and particulates immediately following cleaning operations and dispose of properly off-site.

C. Painting (for new or re-used items after preparation (including after lead-based paint removal):

1. Apply only when the air and surface temperature are between 50-100 degrees F (10-38 degrees C) and the surface temperature is at least 5 degrees F (3 degrees C) above the dew point. The relative humidity shall not be greater than 85% when

paint is applied.

2. Submit to SJRA Project Manager for approval paint system to be utilized. Do not commence painting of prime or finish coats prior to approval of paint system. Paint system to be color matched to Carboline Color Logic system used at other plants.

3. Contain all paint spray to area of painting via protective barrier.

4. System – Alkyd Enamel: Use a high-quality semi-gloss, medium long oil alkyd finish with a minimum solids content of 49 percent by volume. Apply primer as recommended manufacturer. Finish Coat color to be color match of Tnemec color “Clover”.

   a. Prime Coat

      i. DFT = 2-3 mils (50 to 75 microns)

      ii. Products: Ameron 5105, Carboline AD29, Tnemec P4-55, VyGuard 13R29, kem Kromik Universal, or equal (notify Project Manager if products listed are out-of-date).

   b. Finish Coats (2 or more)

      i. DFT = 2-3 mils (50 to 75 microns)

      ii. Products: Ameron 5401HAS, Carboline GP62, Tnemec 2H, VyGuard V20, Sherwin Williams Industrial Enamel, or equal (notify Project Manager if products listed are out-of-date).

3.08 MEASUREMENT AND PAYMENT

A. The following items to be included by the Contractor in the price proposal for the base proposal and alternate proposal items listed in the Proposal Form (Section 00 41 00.01), B. Base Unit Price Table and E. Alternates Table for the estimated work, materials and time for this project, as described in these Specifications and documents.

   2. Removal of the existing electric motor (if specified), removal and inspection of the existing well pump bowl, column pipe assembly, pumping equipment, and well video survey(s), as specified in this Section.

3. Brushing of the well screens, jetting of the fill material from the bottom of the well, acid treatment and disinfection of the well screens, sounding the gravel pack in the well and adding gravel pack if needed, as specified in this Section.

4. Furnishing, installing, and testing of new or refurbished pump bowl, new or reused/refurbished pumping equipment and installing and testing the existing electric motor or a new motor furnished by the Contractor, as specified in this Section.

5. Furnishing and installing new or refurbished combination right-angle gear drive equipment, as specified in this Section.

6. Other approved well, pump and/or motor rehabilitation or replacement work, materials and/or time approved by the Owner or Engineer.

7. Lowering the pump bowl, installing new pump column assembly components and making the well and pumping equipment operational, as specified in this Section.

8. Removing the Owner's existing pumping equipment, installing Contractor's temporary pump equipment and making the well and pumping equipment operational, as specified in this Section.

9. Painting of existing above-ground piping and other specified equipment.

B. The Contractor shall be paid for the water well and pumping equipment rehabilitation or replacement work, pump lowering work, temporary pump equipment work, painting of existing above-ground piping, etc. and all other related project work that is approved and performed in a satisfactory manner and meeting all of the project requirements and specifications, based on the actual depth, setting, length, diameter and number of materials and equipment installed and the actual work performed, and using prices bid for the project as listed in the Proposal Form, including B. Proposal Unit Price Table and/or E. Alternates Table and any Change Order(s), if required.

END OF SECTION

DATA SHEET FOR THE WATER WELL, PUMP AND MOTOR MATERIALS AND EQUIPMENT

A. **SJRA – The Woodlands Well 25**

1. Well Materials:

   a. A copy of the original well material settings sheet is in Appendix A.

      The well is constructed with:
      20-inch diameter surface casing and
      14-inch diameter screen and blank liner.

      Well screen depth interval: approximately 1,107 to 1,592 feet.
      Total screen length: approximately 234 feet.

2. Existing Pumping Equipment:

   a. Pump Model: Goulds 14 RJLC (8 Stages)
      Design Point: 1,500 gpm at TDH of 627 feet

   b. Motor Horsepower: 350 Hp

   c. Pump Setting Depth: 600 feet
      (from base of discharge head to top of upper bowl)

   d. Column Pipe Diameter and Wall Thickness: 10-inch I.D, 0.365 inch

   e. Column Shafting Diameter: 1-15/16 inches

   f. Oil Tubing Diameter: 3-1/2 inches

   m. Airline Tubing:

      (1) Material: 316 stainless steel, 0.25-inch O.D., 0.035-inch wall thickness, PVC-coated, Dekoron Type 1005

      (2) Setting: 600 feet

   n. Water-Level Measuring Pipe:

      (1) Material: PVC, 1-1/4 inches (Schedule 40), round drilled holes

      (2) Setting: 600 feet

3. **Proposed Lowering of Water Well**

   a. Design Point: 1,500 gpm at TDH of 627 feet

   b. Motor Horsepower: 350 Hp

   c. Pump Setting Depth: 700 feet
   (from base of discharge head to top of upper bowl)

   d. Airline Tubing:

      (1) Material: 316 stainless steel, 0.25-inch O.D., 0.035-inch wall thickness, PVC-coated, Dekoron Type 1005

      (2) Setting: 700 feet

   e. Water-Level Measuring Pipe:

      (1) Material: PVC, 1-1/4 inches (Schedule 40), round drilled holes

      (2) Setting: 700 feet

4. Electric Motor Performance Requirements and Equipment:

   350 Hp, TEFC electric motor, premium efficiency.

   Specifications in Section 02673, 2.02, F. and Appendix D.
   San Jacinto River Authority Motor Data 1 Sheet (Appendix D) attachment shall be returned to Owner with the required information filled in before payment will be made.

5. Well, Pump, Motor and Vibration Testing:

   a. Perform well, pump, motor and vibration testing in accordance with
   subsections 1.05 H.9., 1.05 H.10. and 3.06 A.2. in this Section.

6. Chemicals and Dosage/Volume (if approved and performed): Also see subsection 2.02 A. in this Section for chemical specifications.

   a. Chlorine Disinfection (minimum dosage):

      Dosage: 1.0 gallon of sodium hypochlorite per foot of screen (to achieve concentration of 350 mg/L) in a pH range of 6.5 to 7.0. Utilize chlorine enhancer such as Layne's Oximate or Johnson Screens' NW-410.

   b. Hydrochloric Acid (minimum dosage):

Dosage: 4.5 gallons of Acid per foot of 10-inch diameter screen.

c. Hydroxyacetic Acid (minimum dosage):

Dosage: 5.0 gallons of Acid per foot of 10-inch diameter screen.

d. Aqua-Clear PFD (minimum dosage):

Dosage: 1 gallon of chemical per 500 gallons of water (0.2% by volume) in well.

e. Sodium Tripolyphosphate (minimum dosage):

Dosage: 2 pounds of chemical per foot of screen.

f. Sodium Acid Pyrophosphate (minimum dosage):

Dosage: 2 pounds of chemical per foot of screen.

A. **SJRA – The Woodlands Well 31**

1. Well Materials:

   a. A copy of the original well material settings sheet is in Appendix B.

      The well is constructed with:
      20-inch diameter surface casing and
      14-inch diameter screen and blank liner.

      Well screen depth interval: approximately 1,230 to 1,608 feet.
      Total screen length: approximately 247 feet.

2. Existing Pumping Equipment:

   a. Pump Model: Goulds 12 CHC (10 Stages)
      Design Point: 1,500 gpm at TDH of 550 feet

   b. Motor Horsepower: 300 Hp

   c. Pump Setting Depth: 560 feet
      (from base of discharge head to top of upper bowl)

   d. Column Pipe Diameter and Wall Thickness: 10-inch I.D, 0.365 inch

   e. Column Shafting Diameter: 1-15/16 inches

   f. Oil Tubing Diameter: 3-1/2 inches

   m. Airline Tubing:

      (1) Material: 316 stainless steel, 0.25-inch O.D., 0.035-inch wall thickness, PVC-coated, Dekoron Type 1005

      (2) Setting: 560 feet

   n. Water-Level Measuring Pipe:

      (1) Material: PVC, 1-1/4 inches (Schedule 40), round drilled holes

      (2) Setting: 560 feet

3. **Proposed Lowering of Water Well**

   a. Design Point: 1,500 gpm at TDH of 550 feet

   b. Motor Horsepower: 300 Hp

c. Pump Setting Depth: 660 feet
(from base of discharge head to top of upper bowl)

d. Airline Tubing:

(1) Material: 316 stainless steel, 0.25-inch O.D., 0.035-inch wall thickness, PVC-coated, Dekoron Type 1005

(2) Setting: 660 feet

e. Water-Level Measuring Pipe:

(1) Material: PVC, 1-1/4 inches (Schedule 40), round drilled holes

(2) Setting: 660 feet

4. Electric Motor Performance Requirements and Equipment:

300 Hp, TEFC electric motor, premium efficiency.

Specifications in Section 02673, 2.02, F. and Appendix D.
San Jacinto River Authority Motor Data 1 Sheet (Appendix D) attachment shall be returned to Owner with the required information filled in before payment will be made.

5. Well, Pump, Motor and Vibration Testing:

a. Perform well, pump, motor and vibration testing in accordance with
subsections 1.05 H.9., 1.05 H.10. and 3.06 A.2. in this Section.

6. Chemicals and Dosage/Volume (if approved and performed): Also see subsection 2.02 A. in this Section for chemical specifications.

a. Chlorine Disinfection (minimum dosage):

Dosage: 1.0 gallon of sodium hypochlorite per foot of screen (to achieve concentration of 350 mg/L) in a pH range of 6.5 to 7.0. Utilize chlorine enhancer such as Layne's Oximate or Johnson Screens' NW-410.

b. Hydrochloric Acid (minimum dosage):

Dosage: 4.5 gallons of Acid per foot of 10-inch diameter screen.

c. Hydroxyacetic Acid (minimum dosage):

Dosage: 5.0 gallons of Acid per foot of 10-inch diameter screen.

d. Aqua-Clear PFD (minimum dosage):

Dosage: 1 gallon of chemical per 500 gallons of water (0.2% by volume) in well.

e. Sodium Tripolyphosphate (minimum dosage):

Dosage: 2 pounds of chemical per foot of screen.

f. Sodium Acid Pyrophosphate (minimum dosage):

Dosage: 2 pounds of chemical per foot of screen.

DATA SHEET FOR THE WATER WELL, PUMP AND MOTOR MATERIALS AND EQUIPMENT

A. **SJRA – The Woodlands Unspecified Well (if Evangeline Aquifer Well)**

1. Well Materials:

   a. A copy of the original well material settings sheet and specific well, pump and motor materials and equipment information will be provided, if and when a specific well is selected for this project.

      The following well, pump and motor information and preliminary pumping equipment design estimates are provided for general reference

      The well is constructed with:

      16-inch diameter surface casing and
      10-inch diameter screen and blank liner or

      20-inch diameter surface casing and
      14-inch diameter screen and blank liner or

      24-inch diameter surface casing and
      18-inch diameter screen and blank liner.

      Estimated well screen depth interval: between 600 and 1,100 feet.
      Estimated total screen length: approximately 150 feet.

2. Existing Pumping Equipment:

   a. Pump Model: Unknown

   b. Motor Horsepower: 150 to 300 Hp

   c. Pump Setting Depth: 570 to 680 feet
      (from base of discharge head to top of upper bowl)

   d. Column Pipe Diameter and Wall Thickness: 8-inch I.D, 0.322 inch or 10-inch I.D., 0.365 inch

   e. Column Shafting Diameter: 1-15/16 or 2-3/16 inches

   f. Oil Tubing Diameter: 3 or 3-1/2 inches

3. New Permanent Pump Performance Requirements and Equipment:

   a. Design Pumping Rate: 800 gpm (preliminary estimate)

   b. Design Total Dynamic Head (TDH): 630 feet

      Estimated TDH components: Unknown at this time.

      The design pumping rate, total dynamic head (TDH) and other estimates listed are preliminary data for project bid purposes and may be changed based on selection of a production well, review of any well monitoring, testing or other data. Pumps shall have a steep head-capacity curve subject to Engineer approval and meet the performance requirements listed for the pump bowl including the minimum bowl efficiency, head-capacity performance and maximum outside diameter that follows in this Data Sheet in this Section.

   c. Nominal Speed at Rating: 1,770 rpm

   d. Minimum Bowl Efficiency at Design Flow: 81 percent

   e. Pump Bowl Head-Capacity Requirement:
      Minimum change of 200 feet in TDH from 640 to 960 gpm

   f. Maximum Bowl Outside Diameter: 12 inches

   g. Maximum Field Horsepower Required at any Point on Head-Capacity Curve: 180 Hp

   h. Pump Setting Depth: 670 feet
      (from base of discharge head to top of upper bowl)

   i. Suction Pipe Diameter: 8-inch I.D.

   j. Column Pipe Diameter: 8-inch I.D, 0.322 inch and Wall Thickness

   k. Column Shafting Diameter: 1-15/16 inches

   l. Oil Tubing Diameter: 3 inches

   m. Airline Tubing:

      (1) Material: 316 stainless steel, 0.25-inch O.D., 0.035-inch wall thickness, PVC-coated, Dekoron Type 1005

      (2) Setting: 670 feet

n. Water-Level Measuring Pipe:

(1) Material: PVC, 1-1/4 inches (Schedule 40), round drilled holes

(2) Setting: 670 feet

4. New Electric Motor Performance Requirements and Equipment (if needed and approved):

200 Hp , TEFC electric motor, premium efficiency.

Specifications in Section 02673, 2.02, F. and Appendix C.
San Jacinto River Authority Motor Data 1 Sheet (Appendix C) attachment shall be returned to Owner with the required information filled in before payment will be made.

5. Well, Pump, Motor and Vibration Testing:

a. Perform well, pump, motor and vibration testing in accordance with
subsections 1.05 H.9., 1.05 H.10. and 3.06 A.2. in this Section.

6. Chemicals and Dosage/Volume (if approved and performed): Also see subsection 2.02 A. in this Section for chemical specifications.

a. Chlorine Disinfection (minimum dosage):

Dosage: 1.0 gallon of sodium hypochlorite per foot of screen (to achieve concentration of 350 mg/L) in a pH range of 6.5 to 7.0. Utilize chlorine enhancer such as Layne's Oximate or Johnson Screens' NW-410.

b. Hydrochloric Acid (minimum dosage):

Dosage 1: 4.1 gallons of Acid per foot of 10-inch diameter screen.
Dosage 2: 5.9 gallons of Acid per foot of 12-inch diameter screen.
Dosage 3: 8.0 gallons of Acid per foot of 14-inch diameter screen.
Dosage 4: 13.2 gallons of Acid per foot of 18-inch diameter screen.

c. Hydroxyacetic Acid (minimum dosage):

Dosage 1: 4.8 gallons of Acid per foot of 10-inch diameter screen.

Dosage 2: 6.6 gallons of Acid per foot of 12-inch diameter screen.
Dosage 3: 8.8 gallons of Acid per foot of 14-inch diameter screen.
Dosage 4: 14.1 gallons of Acid per foot of 18-inch diameter screen.

d. Aqua-Clear PFD (minimum dosage):

Dosage: 1 gallon of chemical per 500 gallons of water (0.2% by volume) in well.

e. Sodium Tripolyphosphate (minimum dosage):.

Dosage: 2 pounds of chemical per foot of screen.

f. Sodium Acid Pyrophosphate (minimum dosage):

Dosage: 2 pounds of chemical per foot of screen.

DATA SHEET FOR THE WATER WELL, PUMP AND MOTOR MATERIALS AND EQUIPMENT

A. **SJRA – The Woodlands Unspecified Well (if Jasper Aquifer Well)**

1. Well Materials:

   a. A copy of the original well material settings sheet and specific well, pump and motor materials and equipment information will be provided, if and when a specific well is selected for this project.

      The following well, pump and motor information and preliminary pumping equipment design estimates are provided for general reference.

      The well is constructed with:

      16-inch diameter surface casing and
      10-inch diameter screen and blank liner or

      20-inch diameter surface casing and
      14-inch diameter screen and blank liner.

      Estimated well screen depth interval: between 1,050 and 1,700 feet.
      Estimated total screen length: approximately 200 feet.

2. Existing Pumping Equipment:

   a. Pump Model: Unknown

   b. Motor Horsepower: 200 to 450 Hp

   c. Pump Setting Depth: 540 to 760 feet
      (from base of discharge head to top of upper bowl)

   d. Column Pipe Diameter and Wall Thickness: 8-inch I.D., 0.322 inch or 10-inch I.D, 0.365 inch

   e. Column Shafting Diameter: 1-15/16, 2-3/16 or 2-7/16 inches

   f. Oil Tubing Diameter: 3 or 3-1/2 inches

3. New Permanent Pump Performance Requirements and Equipment:

   a. Design Pumping Rate: 1,500 gpm (preliminary estimate)

   b. Design Total Dynamic Head (TDH): 670 feet

      Estimated TDH components: Unknown at this time.

      The design pumping rate, total dynamic head (TDH) and other estimates listed are preliminary data for project bid purposes and may be changed based on selection of a production well, review of any well monitoring, testing or other data. Pumps shall have a steep head-capacity curve subject to Engineer approval and meet the performance requirements listed for the pump bowl including the minimum bowl efficiency, head-capacity performance and maximum outside diameter that follows in this Data Sheet in this Section.

   c. Nominal Speed at Rating: 1,770 rpm

   h. Minimum Bowl Efficiency at Design Flow: 79 percent

   i. Pump Bowl Head-Capacity Requirement:
      Minimum change of 130 feet in TDH from 1,200 to 1,500 gpm

   j. Maximum Bowl Outside Diameter: 13 inches

   k. Maximum Field Horsepower Required at any Point on Head-Capacity Curve: 365 Hp

   h. Pump Setting Depth: 680 feet
      (from base of discharge head to top of upper bowl)

   i. Suction Pipe Diameter: 10-inch I.D.

   j. Column Pipe Diameter: 10-inch I.D, 0.365 inch and Wall Thickness

   k. Column Shafting Diameter: 2-3/16 inches

   l. Oil Tubing Diameter: 3-1/2 inches

   m. Airline Tubing:

      (1) Material: 316 stainless steel, 0.25-inch O.D., 0.035-inch wall thickness, PVC-coated, Dekoron Type 1005

(2) Setting: 680 feet

n. Water-Level Measuring Pipe:

(1) Material: PVC, 1-1/4 inches (Schedule 40), round drilled holes

(2) Setting: 680 feet

4. New Electric Motor Performance Requirements and Equipment (if needed and approved):

200 Hp , TEFC electric motor, premium efficiency.

Specifications in Section 02673, 2.02, F. and Appendix C.
San Jacinto River Authority Motor Data 1 Sheet (Appendix C) attachment shall be returned to Owner with the required information filled in before payment will be made.

5. Well, Pump, Motor and Vibration Testing:

a. Perform well, pump, motor and vibration testing in accordance with
subsections 1.05 H.9., 1.05 H.10. and 3.06 A.2. in this Section.

6. Chemicals and Dosage/Volume (if approved and performed): Also see subsection 2.02 A. in this Section for chemical specifications.

a. Chlorine Disinfection (minimum dosage):

Dosage: 1.0 gallon of sodium hypochlorite per foot of screen (to achieve concentration of 350 mg/L) in a pH range of 6.5 to 7.0. Utilize chlorine enhancer such as Layne's Oximate or Johnson Screens' NW-410.

b. Hydrochloric Acid (minimum dosage):

Dosage 1: 4.1 gallons of Acid per foot of 10-inch diameter screen.
Dosage 2: 8.0 gallons of Acid per foot of 14-inch diameter screen.

c. Hydroxyacetic Acid (minimum dosage):

Dosage 1: 4.8 gallons of Acid per foot of 10-inch diameter screen.
Dosage 2: 8.8 gallons of Acid per foot of 14-inch diameter screen.

d. Aqua-Clear PFD (minimum dosage):

   Dosage: 1 gallon of chemical per 500 gallons of water (0.2% by volume) in well.

e. Sodium Tripolyphosphate (minimum dosage):

   Dosage: 2 pounds of chemical per foot of screen.

f. Sodium Acid Pyrophosphate (minimum dosage):

   Dosage: 2 pounds of chemical per foot of screen.

Friedel Drilling Company
555 City of Hochheim Rd.
Yoakum, Texas 77995

September 2, 1999

Alexander Engineering, Inc.
400 Randal Way, Suite 200
Spring, Texas 78388

Attention: Norm Scholes

RE: Material settings on San Jacinto Well # 25—The Woodlands.

Revised material settings on the San Jacinto Well #25 are as follows:

ITEM	DEPTH FROM	DEPTH TO	LENGTH
20" .500 Wall pipe	+2'	1118'	
14" Blank .375	1018	1124	~~100~~ 106'
14" .25000 screen	1124	1140	16'
14" Blank .375	1140	1144	4'
14" .25000 screen	1144	1160	16'
14" Blank .375	1160	1166	6'
14" .25000 screen	1166	1186	20'
14" Blank .375	1186	1238	52'
14" .25000 screen	1238	1264	26'
14" Blank .375	1264	1300	36'
14" .25000 screen	1300	1305	5'
14" Blank .375	1305	1346	~~45~~ 41'
14" .25000 screen	1346	1376	30'
14" Blank .375	1376	1384	8'
14" .25000 screen	1384	1436	52'
14" Blank .375	1436	1482	46'
14" .25000 screen	1482	1532	50'
14" Blank .375	1532	1588	56'
14" .25000 screen	1588	1610	22'
14" Blank and BP valve	1610	1630	20'

Please let me know of your decisions at your earliest convenience.

Sincerely,

Johnnie Friedel

Johnnie Friedel
President

lkw

ALSAY
INCORPORATED
GROUNDWATER EXPLORATION & DEVELOPMENT

6615 GANT STREET
HOUSTON, TEXAS 77066
PHONE: 281-444-6960
FAX: 281-444-7081

San Jacinto River Authority
Woodlands Water Well #31

Proposed Recommended Material Settings 02/23/07
Screen: .035 slot
Gravel: 10/20

Depth (ft.)		20 " 0.500 wall Casing	14 " 0.500 wall Blank	*14 " 0.500 wall Screen*
0 - 1225		1225 ft.		
1145 - 1230			85 ft.	
1230 - 1293				***63 ft.***
1293 - 1315			22	
1315 - 1349				***34***
1349 - 1368			19	
1368 - 1402				***34***
1402 - 1408			6	
1408 - 1428				***20***
1428 - 1472			44	
1472 - 1497				***25***
1497 - 1529			32	
1529 - 1538				***9***
1538 - 1546			8	
1546 - 1608				***62***
1608 - 1628	TD		20	
		1225 ft.	236 ft.	***247 ft.***

Note: Measurements are from Kelly Bushing +5'

TOTAL MATERIALS:

20 inch Casing.....	1,225 ft.		
14 inch Blank Liner.....	236 ft.		
14 inch Screen.....	***247 ft.***		
Total Depth.....	1,628 ft.		
30 -sack Cement Plug.....	1,630 ft.	---------	1,660 ft.

STATE OF TEXAS WELL REPORT for Tracking #111602

Owner:	**SAN JACINTO RIVER AUTHORITY**	Owner Well #:	**31**
Address:	**2436 SAWDUST RD THE WOODLANDS , TX 77380**	Grid #:	**60-53-4**
Well Location:	**7508 GOSLING RD THE WOODLANDS , TX 77380**	Latitude:	**30° 12' 10" N**
Well County:	**Montgomery**	Longitude:	**095° 28' 45" W**
Elevation:	**No Data**	GPS Brand Used:	**MAGELLAN 315 GPS**
Type of Work:	**New Well**	Proposed Use:	**Public Supply; Plans Approved by TCEQ**

Drilling Date: Started: **1/24/2007**
Completed: **5/2/2007**

Diameter of Hole: Diameter: **35 in From Surface To 100 ft**
Diameter: **26 in From 0 ft To 1225 ft**
Diameter: **30 in From 1225 ft To 1628 ft**

Drilling Method: **Mud Rotary**

Borehole Completion: Gravel Packed From: **1150 ft to 1628 ft**
Gravel Pack Size: **10/20 Underreamed**

Annular Seal Data: 1st Interval: **From 0 ft to 100 ft with 128 (#sacks and material)**
2nd Interval: **From 0 ft to 1225 ft with 1140 (#sacks and material)**
3rd Interval: **No Data**
Method Used: **HALIBURTON**
Cemented By: **SCHLUMBERGER**
Distance to Septic Field or other Concentrated Contamination: **150 ft**
Distance to Property Line: **50 ft**
Method of Verification: **ENGINEERING FIRM**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level: Static level: **283.25 ft. below land surface on 5/2/2007**
Artesian flow: **No Data**

Packers: **N/A**

Plugging Info: Casing left in well: Cement/Bentonite left in well:
From (ft) To (ft) From (ft) To (ft) Cem/Bent Sacks Used
N/A

Type Of Pump: **Turbine**
Depth to pump bowl: **665 ft**

Well Tests: **Pump**
Yield: **1697 GPM with 5521 ft drawdown after 36 hours**

Water Quality: Type of Water: **FRESH**
Depth of Strata: **No Data**
Chemical Analysis Made: **Yes**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for

completion and resubmittal.

Company Information:	**ALSAY INCORPORATED** **6615 GANT** **HOUSTON , TX 77066**
Driller License Number:	**2048**
Licensed Well Driller Signature:	**NEIL ROLLIE**
Registered Driller Apprentice Signature:	**ROBERT CURRY**
Apprentice Registration Number:	**1134**
Comments:	**Vaurigaud, Peter 3358** **Trevino, Felix 3413**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking **#111602**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 – 6 Sub-structure
6 – 10 Topsoil
10 – 80 Sandy Clay
80 – 164 Clay (Reddish Brown)
164 – 236 Sand
236 – 286 Clay (Brown)
286 – 324 Sand
324 – 402 Clay (Gray)
402 – 464 Sand
464 – 472 White Clay
472 – 494 Sand
494 – 676 Clay (Gray)
676 – 706 Sand
706 – 728 Clay (Gray)
728 – 774 Sand
774 – 784 Whitish Gray Clay
784 – 936 Sand
936 – 970 Clay (Gray)
970 – 998 Sand
998 – 1220 Clay (Gray)
1220 – 1294 Sand
1294 – 1314 Clay (Gray)
1314 – 1430 Sand
1430 – 1472 Clay (Gray)
1472 – 1500 Sand
1500 – 1526 Clay (Gray)

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
30 NEW STEEL 0/100 .281
20 NEW STEEL +3/1225 .500
14 NEW STEEL WITH 1145/1628 .500
STAINLESS STEEL SCREEN .035

1526 – 1610 Sand
1610 – 1616 White Clay
1616 – 1676 Sand
1676 – 1822 Clay (Gray)