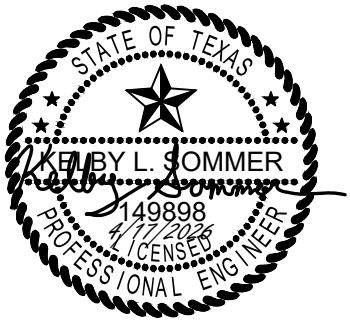
TECHNICAL SPECIFICATIONS

Lake Fork Dam Low Level Outlet Repair
Wood County, Texas

SRA Project No. RFB26-0701
Schnabel Reference No. 25220002.001
April 17, 2026



Prepared for:
Sabine River Authority of Texas

Prepared by:
Schnabel Engineering, LLC
12301 Research Blvd., Bldg IV, Ste 250
Austin, TX 78759
TBPE Registration No. 17846

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WOOD COUNTY, TEXAS

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SECTION 01 10 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. The work to be performed under this contract is located at Lake Fork Dam, five miles west of Quitman, Texas. The improvements to the low-level outlet infrastructure at Lake Fork Dam will support continued operations of the facility for making regular water releases from the reservoir storage. The work includes rehabilitation of sluice gates, replacement of gate actuators, repair of outlet pipe protective lining systems, facility access improvements, piping repair, and additional components as shown in the contract drawings and these specifications for a complete project.

B. Related Requirements:

1. Retain Subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

2. Section 01 33 00 – Submittal Procedures

1.2 PROJECT INFORMATION

A. Name: Lake Fork Dam Low Level Outlet Repair

1. Project Location: Wood County, TX

B. Owner: Sabine River Authority of Texas

1. Owner's Representative: Mr. Mark Mann, PE.

C. Project Engineer: Schnabel Engineering, LLC

D. Engineer's Consultants: Engineer retains the following design professionals, who prepare designated portions of the Contract Documents:

1. Hungry Horse Engineering (H2E): Electrical Design

E. Construction management: Email correspondence will be sufficient for this scale of project. If project management software is planned, this will be at the discretion of the Contractor and be approved by the Owner and Engineer.

1. See Section 01 33 00 - Submittal Procedures for submittal requirements

1.3 CONTRACT DESCRIPTION

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

B. The Work of this Contract is comprised of rehabilitation and replacement of items at the Lake Fork Dam.

C. The Work of this Contract includes, but is not limited to, construction of the following items:

1. New access platform in the dry vault
2. Rehabilitation of low-level outlet pipes
3. Bid Alternates:
    a. Inspection of existing cast-iron slide gates to confirm suitability for reuse and rehabilitation of existing cast-iron slide gates, and replacement of slide gate actuators
    b. Replacement of existing slide gates with new, fabricated stainless steel slide gates and replacement of slide gate actuators

D. The Contractor shall provide all demolition, structural, mechanical, and electrical Work in accordance with the Contract Documents.

E. Contractor shall be responsible for negotiations of any waivers or alternate arrangements required for transportation of materials to/from the site.

F. Maintain conditions of site access such that access is not hindered as a result of construction related deterioration.

1. Any undue damage to the site as determined by the Owner shall be immediately repaired by the Contractor to the satisfaction of the Owner.

1.4 WORK BY OWNER

A. Coordinate Work with utilities of Owner and public or private agencies.

B. Owner will remove and retain possession of the following items before start of Work:

1. Ultrasonic flow meters on low level outlet pipelines.

C. Owner will require access to crest of Lake Fork Dam around and beyond the area set for this Work. Contractor to coordinate locations of equipment, stockpiles, laydown areas, and their work plans to maintain Owner’s access for general dam operations. This includes coordination of electrical work and maintaining power supplies to Owner’s regular operations and emergency operations equipment.

1.5 CONTRACTOR'S USE OF SITE

A. Restricted Use of Site: Contractor shall have limited use of Project Site for construction operations as indicated on Drawings and as indicated by requirements of this Section.

B. Limits on Use of Site: Limit use of Project Site to areas of project Work and areas indicated on the Drawings for staging and laydown. If additional area is determined to be necessary, Contractor shall coordinate with the Owner.

C. Time Restrictions for Performing Work:

D. Work shall be coordinated with Owner around facility operations and may limit Contractor’s ability to continue work or provide opportunities for additional access.

E. Utility Outages and Shutdown:

1. Coordinate and schedule electrical and other utility outages with Owner.
2. Outages: Allow only at previously agreed upon times.
3. At least one week before scheduled outage, submit outage request plan to Owner itemizing dates, times, and duration of each requested outage.

F. Construction Plan: Before starting construction, submit a construction plan regarding access to Work, use of Site, and utility outages for acceptance by Owner. After acceptance of plan,

construction operations shall comply with accepted plan unless deviations are accepted by Owner in writing.

1.6 WORK SEQUENCE

A. Construct Work in order to accommodate Owner's operational requirements during construction period. Coordinate construction schedule and operations with Owner.

B. Sequencing of Construction Plan: Before starting construction, submit electronic copy of construction plan regarding phasing of demolition, rehabilitation, and new Work for acceptance by Owner. After acceptance of plan, comply with accepted plan when coordinating construction sequencing unless deviations are accepted by Owner in writing.

1.7 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit Work to daylight hours, generally from 7 a.m. to 6 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner.

C. On-Site Work Day Restrictions: Do not perform Work resulting in operational restrictions on Site during Work blackout days indicated by Owner.

D. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions, and only after arranging for temporary utility services according to requirements indicated above.

E. Noise, Vibration, Dust, and Odors: Coordinate with Owner operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy.

1. Notify Owner not less than two days in advance of proposed disruptive operations.

2. Obtain Owner's written permission before proceeding with disruptive operations.

F. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, marijuana, and other controlled substances on Owner's property is not permitted.

1.8 OWNER USE OF SITE

A. Owner will operate at Site during entire period of construction.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule Work to accommodate Owner operations.

1.9 PERMITS

A. Furnish all necessary permits for construction of Work, including at least the following:

1. Confined space permit

2. Sandblasting permit

B. Furnish any other permits required by Wood County or the State of Texas related to completing the Work detailed in the Contract Documents.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Schedule of Values.

B. Application for Payment.

C. Change procedures.

D. Defect assessment.

E. Lump Sum Bid Items.

F. Lump Sum Bid Alternates.

1.2 SCHEDULE OF VALUES

A. Schedule of Values shall be a listing of all cost-loaded, on-site construction activities form the progress schedule, listed in numerical order, showing that the sum total of all cost-loaded activities equal the Contract Value.

B. When the schedule is changed or revised to include added or deleted work, the Schedule of Values shall also be revised such that the sum total of all cost-loaded activities continuously equals the current Contract values

1. Equate the aggregate of these costs to the Lump Sum Contract Price.
2. Submit any revisions with each Application for Payment.

C. Prepare Schedule of Values identifying costs of major items of work.

D. Schedule of Values shall at least include all items in Table of Contents of these Specifications, and any other major items detailed on the Drawings.

1.3 APPLICATION FOR PAYMENT

A. Submit electronic file to Owner of each Application for Payment on EJCDC C-620 - Contractor's Application for Payment, as modified by the Owner and provided in the contract documents.

B. Content and Format: Use Schedule of Values for listing items in Application for Payment.

C. Submit updated construction schedule with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in the Agreement, but not more than monthly.

E. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:

1. Current construction photographs specified in Section 013300 - Submittal Procedures.
2. Partial release of liens from major Subcontractors and vendors
3. Record Documents as specified in Section 01 70 00 - Execution and Closeout Requirements, for review by Owner, which will be returned to Contractor
4. Affidavits attesting to off-Site stored products

5. Construction Progress Schedule, revised and current as specified in Section 01 33 00 - Submittal Procedures

1.4 CHANGE PROCEDURES

A. Document requested substitutions according to Section 01 33 00 - Submittal Procedures.

B. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.

C. Construction Change Directive: Engineer may issue directive, signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

D. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.

E. Change Order Forms: EJCDC C-940 - Work Change Directive.

F. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

G. Correlation of Contractor Submittals:

1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.

2. Promptly revise Progress Schedules to reflect change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.

3. Promptly enter changes in Record Documents.

1.5 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.

C. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.

D. Authority of /Engineer and Owner to assess defects and identify payment adjustments is final.

E. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:

1. Products wasted or disposed of in a manner that is not acceptable.

2. Products determined as unacceptable before or after placement

3. Products not completely unloaded from transporting vehicle

4. Products placed beyond lines and levels of the required Work

5. Products remaining on hand after completion of the Work.

6. Loading, hauling, and disposing of rejected products.

1.6 LUMP SUM BID ITEMS

A. Base Bid Lump Sum Items:

1. Contractor’s responsibility to provide a complete and operational system as specified in Section 01 10 00 – Summary of Work, included in Lump Sum price.

2. All items listed in the Contract Documents that are not listed in other items in the section.

3. Does not include Bid Alternates indicated in Summary of Work or Bid Form.

4. Prices shall include all taxes, bonds, insurance, fees, overhead, profit, permits, material, labor, equipment, transportation, and any other incidentals to install, test, remove, dispose or handle the items and provide a complete working system according to the Contract Documents and within the limits of Contractor’s work area as defined in the Contract Documents.

5. Note that if existing slide gates fail shop inspections, bid alternate for full gate replacement will be activated.

1.7 LUMP SUM BID ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement. The Owner-Contractor Agreement may identify certain Alternates to remain an Owner option for a stipulated period of time.

B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for scope of Work affected.

1. Coordinate related requirements among Specification Sections as required.

2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.

3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

4. The final selected option in the contract shall be delivered as a fully functional system including all parts required to achieve such functionality, regardless of their explicit inclusion in the Summary of Work and Bid Form.

1.8 BID FORM

A. See Bid Form for full breakdown of lump sum base bid items lump sum bid alternates.

B. Contractor must provide pricing for all Bid Alternates for Owner’s final selection.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Requirements and procedures for submittals

1.2 SUBMITTAL PROCEDURES

A. Prepare submittals in the English language. Do not include information in other languages. Present measurements in customary American units (feet, inches, pounds, etc.).

B. Provide submittal information from only one manufacturer for a specified product. Submittals with multiple manufacturers for one product will be rejected without review.

C. Edit and/or annotate all submittals so that the submittal specifically applies to only the item intended to be furnished. Neatly cross out all extraneous text, options, models, etc. that do not apply to the equipment being furnished, so that the only information remaining is applicable to the equipment being furnished. Highlight technical date that is applicable to the item being furnished.

D. Transmit each submittal with Engineer-accepted form.

E. Required submittal numbering format shall adhere to the following:
   1. Section number-sequential number-resubmittal number
   2. Example: 40 05 57-002-1:
      a. “40 05 57” indicates the affected specification is Section 40 05 57.
      b. “002” indicates the second submittal under this section.
      c. “1” indicates the first submittal of the Submittal 40 05 57-002.
         1) A “2” indicates the first resubmittal of Submittal 40 05 57-002 and so on.

F. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.

G. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.

H. Schedule submittals to expedite Project and submit electronic submittals via email as PDF electronic files. Coordinate submission of related items.

I. For each submittal for review, allow 21 days excluding delivery time to and from Contractor.
   1. When a submittal cannot be returned within the specified period, Engineer will, within a reasonable time after receipt of the submittal, give notice of the date by which that submittal will be returned.
   2. Contractor shall notify Engineer in writing that timely review of a submittal is critical to the progress of the Work.

J. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.

K. Allow space on submittals for Contractor and Engineer review stamps.

L. When revised for resubmission, identify changes made since previous submission.

1. Provide responses to Engineer’s comments on preceding submittals. Any resubmittal that does not contain responses to the Engineer's previous comments shall be returned as Revise and Resubmit. No further review will be performed until these responses are received.

M. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

N. Submittals not requested will not be recognized nor processed.

O. Incomplete Submittals: Engineer will not review incomplete submittals. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

P. Review Costs:
1. Costs incurred by Owner as a result of additional reviews of a particular submittal after the second time it has been reviewed shall be borne by Contractor.
2. Reimbursement to Owner will be made by deducting such costs from Contractor's subsequent progress payments.

1.3 CONSTRUCTION PROGRESS SCHEDULES

A. Within 10 days after date established in Notice to Proceed, submit proposed preliminary schedule for the Project.

B. Contractor shall participate in review of preliminary schedule with Owner.

C. Submit revised schedule within 10 days after joint review.

D. Update schedules with each Application for Payment.
1. Schedule Updates:
    a. Overall percent complete, projected, and actual.
    b. Completion progress by listed activity and sub-activity to within five working days prior to submittal.
    c. Changes in Work scope and activities modified since submittal.
    d. Delays in submittals or resubmittals, deliveries, or Work.
    e. Adjusted or modified sequences or Work.
    f. Other identifiable changes.
    g. Revised projections of progress and completion.
2. Narrative Progress Report:
    a. Submit with each submission of Progress Schedule.
    b. Summary of Work completed during the past period between reports.
    c. Work planned during the next period.
    d. Explanation of differences between summary of Work completed and Work planned in previously submitted reports.
    e. Current and anticipated delaying factors and estimated impact on other activities and completion milestones.
    f. Corrective action taken or proposed.

E. Bar Chart Schedules:
1. Format: Bar chart schedule, to include at least:
    a. Identification and listing in chronological order of those activities reasonably required to complete the Work, including:
        1) Subcontract Work.
        2) Major equipment design, fabrication, factory testing, and delivery dates including required lead times.
        3) Move-in and other preliminary activities.

4) Equipment and equipment system test and startup activities.
5) Project closeout and cleanup.
6) Work sequences, constraints, and milestones.

b. Listing identified by Specification Section number.
c. Construction Critical Path
d. Identification of the following:
1) Horizontal time frame by year, month, and week.
2) Duration, early start, and completion for each activity and subactivity.
3) Critical activities and Project float.
4) Subschedules to further define critical portions of Work.

F. Updating Schedules
1. Maintain schedules to record actual start and finish dates of completed activities.
2. Indicate progress of each activity to date of revision, with projected completion date of each activity. Annotate schedules to depict current status of Work.
3. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
4. Upon approval of a Change Order, include the change in the next schedule submittal.
5. Indicate changes required to maintain Date of Substantial Completion.
6. Submit sorts as required to support recommended changes.
7. Prepare narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action take or proposed and its effect.

1.4 PRODUCT DATA

A. Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.5 SHOP DRAWINGS

A. Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
1. Include signed and sealed calculations to support design.
2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
3. Make revisions and provide additional information when required by Engineer or by authorities having jurisdiction.

D. Submit electronic submittals via email as PDF electronic files.

E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.6 OTHER SUBMITTALS

A. Closeout Submittals: Comply with Section 01 70 00 - Execution and Closeout Requirements.

B. Submit data for Engineer's knowledge as Contract administrator or for Owner.

C. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.7 TEST REPORTS

A. Submit reports for Engineer's knowledge as Contract administrator or for Owner.

B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.8 CERTIFICATES

A. Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.9 MANUFACTURER'S INSTRUCTIONS

A. Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.

B. Submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Engineer in quantities specified for Product Data.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.10 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Engineer's knowledge as Contract administrator or for Owner.

B. Submit report in duplicate within 5 days of observation to Engineer for information.

C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.11 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of Site and construction throughout progress of Work produced by an experienced photographer acceptable to Engineer.

B. Each month submit photographs with Application for Payment.

C. Digital Images: Deliver complete set of digital image electronic files on external hard drive, or cloud storage platform acceptable to the Owner, to Owner with Project record documents. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as sensor, uncropped.

1. Digital Images: Native format (i.e., JPEG), produced by digital camera with minimum sensor size of 4.0 megapixels, and image resolution of not less than 1024 by 768 pixels.
2. Date and Time: Include date and time in filename for each image.

1.12 CONTRACTOR REVIEW

A. Review for compliance with Contract Documents and approve submittals before transmitting to Engineer.

B. Contractor: Responsible for:
1. Determination and verification of materials including manufacturer's catalog numbers.
2. Determination and verification of field measurements and field construction criteria.
3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
4. Determination of accuracy and completeness of dimensions and quantities.
5. Confirmation and coordination of dimensions and field conditions at Site.
6. Construction means, techniques, sequences, and procedures.
7. Safety precautions.
8. Coordination and performance of Work of all trades.

C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.

D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

1.13 ENGINEER REVIEW

A. Review description:
1. Engineer will be entitled to rely upon the accuracy or completeness of designs, calculations, or certifications made by licensed professionals accompanying a particular submittal whether or not a stamp or seal is required by Contract Documents or Laws and Regulations.
2. Engineer's review of submittals shall not release Contractor from Contractor's responsibility for performance of requirements of Contract Documents. Neither shall Engineer's review release Contractor from fulfilling purpose of installation nor from Contractor's liability to replace defective work.
3. Engineer's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents.
4. Deficient submittals will be returned along with the transmittal form which will be marked to indicate deficient areas.
5. Engineer's review does not extend to:
    a. Accuracy of dimensions, quantities, or performance of equipment and systems designed by Contractor.
    b. Contractor's means, methods, techniques, sequences, or procedures except when specified, indicated on the Drawings, or required by Contract Documents.
    c. Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.
    d. Engineer can accept or reject any exception at their sole discretion.

B. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six or more submittals or items in one day or 15 or more submittals or items in one week. If "mass submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner and Contractor.

C. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order.

D. Review response will be returned to Contractor with one of the following dispositions:
   1. No Exceptions Taken
      a. There are no notations or comments on the submittal, and the Contractor may release the equipment for production.
   2. Make Corrections Noted
      a. The Contractor may proceed with the Work; however, all notations and comments must be incorporated into the final product.
   3. Revise & Resubmit
      a. Contractor may not proceed with the Work described in the submittal.
      b. Contractor assumes responsibility for proceeding without approval.
      c. Resubmittal of complete submittal package is required.
   4. Rejected
      a. Contractor may not proceed with the Work described in the submittal.
      b. The submittal does not meet the intent of the Contract Documents. Resubmittal of complete submittal package is required with materials, equipment, methods, etc. that meet the requirements of the contract documents.
   5. Receipt Acknowledged
      a. This is used in acknowledging receipt of informational submittals that address means and methods of construction such as schedules and work plans, conformance test reports, health, and safety plans, etc.

1.14 PRODUCT SUBSTITUTIONS

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

B. 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. When this method of specifying is used, along with “or Engineering Approved Equal” or similar language, 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 of equal quality and proven capable of accomplishing the same tasks as the products specifically indicated.

C. Where only one manufacturer is listed, and no “or equal” clause is included, the contractor shall provide equipment of the type indicated, from the listed manufacturer, unless an alternate is approved by formal substitution request.

D. Other types of equipment and types of material may be acceptable at the sole discretion of the Engineer.

E. In making request for substitution or in using an approved product, Contractor shall do the following:
   1. Investigate the proposed product and determine that it is equal to or superior in all respects to that specified, and that it will perform the function for which it is intended.
   2. Contractor will provide same guarantee for substitute item as for product specified.
   3. Contractor 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. Contractor waives all claims for additional costs related to substitution which subsequently arise.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Requirements for Quality Control and Quality Assurance activities to be performed by the Contractor and Engineer, respectively, for the project.

1.2 QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.

B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Perform Work using persons qualified to produce required and specified quality.

D. Products, materials, and equipment may be subject to inspection by Engineer and Owner at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.

E. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 QUALITY REQUIREMENTS

A. Contractor’s QA/QC program shall be compatible with applicable standards, codes, and current industry practices.

B. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.

C. Conform to reference standard by date of issue current as of date of Contract Documents except where specific date is established by code.

D. Obtain copies of standards and maintain them on Site when required by product Specification Sections.

E. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

F. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference in reference documents.

1.5 TESTING AND INSPECTION SERVICES

A. Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing.

1. Before starting Work, submit testing laboratory name, address, and telephone number, and names of full-time specialist and responsible officer.

2. Submit copy of report of laboratory facilities' inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.

B. Independent firm will perform tests, inspections, and other services specified in individual Specification Sections and as required by Engineer.

1. Laboratory: Authorized to operate in State of Texas.

2. Laboratory Staff: Maintain full-time specialist on staff to review services.

3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.

C. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by Engineer or Owner.

D. Reports shall be submitted by independent firm to Engineer, Contractor, and authorities having jurisdiction, in Texas, indicating observations and results of tests and compliance or noncompliance with Contract Documents.

1. Submit final report indicating correction of Work previously reported as noncompliant.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Engineer and independent firm 24 hours before expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.

F. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.

G. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.

H. Agency Responsibilities:

1. Test Samples of mixes submitted by Contractor.

2. Provide qualified personnel at Site. Cooperate with Engineer and Contractor in performance of services.

3. Perform indicated sampling and testing of products according to specified standards.

4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or products.

6. Perform additional tests required by Engineer.

7. Attend preconstruction meetings and progress meetings.

I. Agency Reports: After each test, promptly submit report to Engineer, Contractor, and Owner. When requested by Engineer, provide interpretation of test results. Include the following:

1. Date issued.

2. Project title and number.

3. Name of inspector.

4. Date and time of sampling or inspection.

5. Identification of product and Specification Section.

6. Location in Project.

7. Type of inspection or test.

8. Date of test.

9. Results of tests.

10. Conformance with Contract Documents.

J. Limits on Testing Authority:

1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Agency or laboratory may not approve or accept any portion of the Work.

3. Agency or laboratory may not assume duties of Contractor.

4. Agency or laboratory has no authority to stop the Work.

1.6 MANUFACTURER'S FIELD SERVICES

A. When specified in individual Specification Sections, require material or product suppliers or manufacturers, to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, and adjusting, and balancing of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer is subject to approval of Engineer and Owner.

C. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

D. Refer to Section 01 33 00 - Submittal Procedures, "Manufacturer's Field Reports" Article.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Examination

B. Preparation

C. Field engineering

D. Execution

E. Cutting and patching

F. Protecting installed construction

G. Starting of systems

H. Demonstration and instruction

I. Testing, adjusting, and balancing

J. Closeout procedures

K. Project record documents

L. Operation and maintenance data

M. Manual for materials and finishes

N. Manual for equipment and systems

O. Spare parts and maintenance products

P. Product warranties and product bonds

Q. Final cleaning

1.2 EXAMINATION

A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual Specification Sections.

D. Verify that utility services are available with correct characteristics and in correct locations.

1.3 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

1.4 FIELD ENGINEERING

A. Locate and protect survey controls and reference points. Promptly notify Engineer of discrepancies discovered.

B. Control datum is indicated on Drawings.

C. Confirm Drawing dimensions and elevations.

D. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.

E. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.

F. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

1.5 EXECUTION

A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.

B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.

D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.

2. Physically separate products in place and provide electrical insulation or protective coatings to prevent galvanic action or corrosion between dissimilar metals.

3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual effect choices to Engineer for final decision.

E. Allow for expansion of materials and building movement.

F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.

1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.

2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.

G. Mounting Heights: Where not indicated, mount individual units of Work at industry-recognized standard mounting heights for particular application indicated.

1. Refer questionable mounting height choices to Engineer for final decision.

H. Adjust operating products and equipment to ensure smooth and unhindered operation.

I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

1.6 CUTTING AND PATCHING

A. Employ skilled and experienced Installers to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting the following:

1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight-exposed elements.
5. Work of Owner or separate Contractor.

C. Execute cutting, fitting, and patching to complete Work and to accomplish the following:

1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and nonconforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute Work by methods to avoid damage to other Work and to provide proper surfaces to receive patching and finishing.

E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products according to requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

J. Identify the hazardous substances or conditions exposed during the Work to Engineer for decision or remedy.

1.7 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual Specification Sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

C. Prohibit traffic from landscaped areas.

1.8 STARTING OF SYSTEMS

A. Coordinate schedule for startup of various equipment and systems.

B. Notify Engineer and Owner 10 days prior to startup of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify that tests, meter readings, and electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute startup under supervision of manufacturer's representative or Contractors' personnel according to manufacturer's instructions.

G. When specified in individual Specification Sections, require manufacturer to provide authorized representative who will be present at Site to inspect, check, and approve equipment or system installation prior to startup and will supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01 33 00 - Submittal Procedures stating that equipment or system has been properly installed and is functioning correctly.

1.9 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of final inspection.

B. Demonstrate Project equipment and instruct by qualified representative who is knowledgeable about the Project.

C. Video Recordings: Provide high-quality color video recordings of demonstration and instructional sessions. Engage commercial videographer to record sessions. Include classroom instructions, demonstrations, board diagrams, and other visual aids. Include menu navigation.

D. For equipment or systems requiring seasonal operation, perform demonstration for other seasons.

E. Use operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time at equipment location.

G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

H. Allot the required instruction time for each item of equipment and system as specified in individual Specification Sections.

1.10 TESTING, ADJUSTING, AND BALANCING

A. Contractor shall be responsible for initial testing, adjusting, and balancing of installed equipment in accordance with the manufacturer's requirements.

1.11 CLOSEOUT PROCEDURES

A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:

1. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations, and instructions to Owner's operating and maintenance personnel as specified in compliance with this Section.

2. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.

3. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.

4. Make final change-over of locks and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.

5. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.

6. Perform final cleaning according to this Section.

B. Substantial Completion Inspection:

1. When Contractor considers Work to be substantially complete, submit to Owner:
   a. Written certificate that Work, or designated portion, is substantially complete.
   b. List of items to be completed or corrected (initial punch list).

2. Within seven days after receipt of request for Substantial Completion, Owner will make inspection to determine whether Work or designated portion is substantially complete.

3. Should Owner determine that Work is not substantially complete:
   a. Owner will promptly notify Contractor in writing, stating reasons for its opinion.
   b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Owner.
   c. Owner will reinspect Work.
   d. Redo and Inspection of Deficient Work: Repeated until Work passes Owner’s inspection.

4. When Owner finds that Work is substantially complete, Engineer will:
   a. Prepare Certificate of Substantial Completion on EJCDC C-625 - Certificate of Substantial, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and Owner (final punch list).
   b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.

5. After Work is substantially complete, Contractor shall:
   a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
   b. Complete Work listed for completion or correction within time period stipulated.

6. Owner will occupy all of Project Site as specified in Section 01 10 00 - Summary of Work.

C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.

1. When Contractor considers Work to be complete, submit written certification that:
   a. Contract Documents have been reviewed.
   b. Work has been examined for compliance with Contract Documents.

c. Work has been completed according to Contract Documents.
d. Work is completed and ready for final inspection.

2. Submittals: Submit following:
   a. Final punch list indicating all items have been completed or corrected.
   b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
   c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
   d. Accounting statement for final changes to Contract Sum.

3. Perform final cleaning for Contractor-soiled areas according to this Section.

D. Final Completion Inspection:

1. Within seven days after receipt of request for final inspection, Owner will make inspection to determine whether Work or designated portion is complete.

2. Should Owner consider Work to be incomplete or defective:
   a. Owner will promptly notify Contractor in writing, listing incomplete or defective Work.
   b. Contractor shall remedy stated deficiencies and send second written request to Owner that Work is complete.
   c. Owner will reinspect Work.
   d. Redo and Inspection of Deficient Work: Repeated until Work passes Owner‘s inspection.

1.12 PROJECT RECORD DOCUMENTS

A. At Site, maintain one complete set of record document prints in custody during entire period of construction; record actual revisions to the Work including:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications to the Contract.

5. Reviewed Shop Drawings, product data, and Samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.

7. References to RFIs, Change Orders, etc. are not acceptable as as-built conditions.

B. Revisions to the Contract Documents shall be legible and shall be prepared using the following color scheme:

1. Red shall indicate new items, deviations, and routing.

2. Green shall indicate items removed or deleted.

3. Blue shall be used for relevant notes and descriptions.

C. Ensure entries are complete and accurate, enabling future reference by Owner.

D. Store record documents separate from documents used for construction.

E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates used.

3. Changes made by Addenda, bulletin, Change Order, and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:

1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.

2. Include locations of concealed elements of the Work.

3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.

4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.

5. Identify and locate existing items encountered during Project.

6. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

7. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

8. Field changes of dimension and detail.

9. Details not on original Drawings.

1.13 OPERATION AND MAINTENANCE DATA

A. Submit in PDF composite electronic indexed file.

B. Submit data bound in 8-1/2 x 11-inch text pages, three D side ring binders with durable plastic covers.

C. Prepare binder cover 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. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

F. Contents: Prepare table of contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.

2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Include the 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 finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

g. Safety precautions are to be taken when operating and maintaining or working near equipment.

3. Part 3: Project documents and certificates, including the following:
   a. Shop Drawings and product data.
   b. Certificates.
   c. Photocopies of warranties.

1.14 MANUAL FOR MATERIALS AND FINISHES

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.

B. For equipment or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes before Substantial Completion. Completed volumes, with Engineer comments, will be returned after Substantial Completion. Revise content of document sets as required prior to final submission.

D. Submit two sets of revised final volumes within 10 days after final inspection.

E. Submit in PDF composite electronic indexed file of final volumes within 10 days after final inspection.

F. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom-manufactured products.

G. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

H. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

I. Additional Requirements: As specified in individual product Specification Sections.

J. Include listing in table of contents for design data, with tabbed fly sheet and space for insertion of data.

1.15 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes before Substantial Completion. Completed volumes, with Engineer comments, will be returned after Substantial Completion. Revise content of document sets as required prior to final submission.

D. Submit two sets of revised final volumes within 10 days after final inspection.

E. Submit in PDF composite electronic indexed file of final volumes within 10 days after final inspection.

F. Equipment and Systems: Include description of unit or system and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

G. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; by label machine.

H. Include color-coded wiring diagrams as installed.

I. Operating Procedures: Include startup, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.

J. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

K. Include servicing and lubrication schedule and list of lubricants required.

L. Include manufacturer's printed operation and maintenance instructions.

M. Include sequence of operation by controls manufacturer.

N. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

O. Include control diagrams by controls manufacturer as installed.

P. Include Contractor's coordination drawings indicating installed color-coded piping diagrams.

Q. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

R. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

S. Include test and balancing reports as specified in Section 01 40 00 - Quality Requirements.

T. Additional Requirements: As specified in individual product Specification Sections.

U. Include listing in table of contents for design data with tabbed dividers and space for insertion of data.

1.16 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.

B. Deliver to Project Site and place in location as directed by Owner; obtain receipt prior to final payment.

1.17 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible Subcontractors, suppliers, and manufacturers within ten days after completion of applicable item of Work.

B. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.

C. Verify documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Include table of contents and assemble in three D side ring binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.

2. Make other submittals within ten days after date of Substantial Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.18 FINAL CLEANING

A. Execute final cleaning prior to final Project assessment.

B. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces.

C. Replace filters of operating equipment.

D. Clean debris from roofs, gutters, downspouts, and drainage systems.

E. Clean Site; sweep paved areas, rake clean landscaped surfaces.

F. Remove waste and surplus materials, rubbish, and construction facilities from Site.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 03 60 00

GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes materials and placement of non-shrink cementitious grout and epoxy grout for base plates and anchors as designated on the Drawings.

B. Use non-shrink cementitious grout for repair of holes and defects in concrete members; bedding and grouting of equipment and framework base plates as designated on Drawings.

C. Use epoxy grout for embedding anchors and temporary supports in concrete.

1.2 MEASUREMENT AND PAYMENT

A. The basis for measurement and payment is provided in Section 01 22 00 – Price and Payment Procedures.

1.3 REFERENCES

A. American Concrete Institure (ACI)

1. ACI 301 – Specifications for Structural Concrete.
2. ACI – Code Requirements for Environmental Engineering Concrete Structures.

B. ASTM International

1. ASTM C33 – Standard Specification for Concrete Aggregates.
2. ASTM C40 – Test Method for Organic Impurities in Fine Aggregates for Concrete.
3. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
4. ASTM C159 – Standard Specification for Portland Cement.
5. ASTM C191 – Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
6. ASTM C595 – Standard Specification for Blended Hydraulic Cements.
7. ASTM C827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixture.

C. US Army Corps of Engineers (USACE)

1. CRD-C 621 – Corps of Engineers Specification for Non-Shrink Grout.

D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.4 SUBMITTALS

A. Meet submittal requirements of Section 01 33 00 - Submittal Procedures.

B. Product Data: Submit product data on grout to be incorporated into the Work.

C. Manufacturer’s Instructions: Submit manufacturer’s instructions and recommendations for mixing, handling, surface preparation, placement, curing and appropriate uses for each type of non-shrink and epoxy grouts used in the Work.

D. Grout strength test reports to demonstrate compliance of strength requirements with Section 3.4.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Ensure that pre-packaged materials are stored in an approved location.

B. Deliver grout in manufacturer's unopened containers with proper labels intact.

C. Store grout in a dry shelter, protect from moisture.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not perform grouting if temperatures exceed 95 degrees F.

B. Maintain minimum temperature of 50 degrees F before, during, and after grouting, until grout has set.

PART 2 - PRODUCTS

2.1 NON-SHRINK GROUT

A. Non-shrink grout shall be an inorganic, non-gas forming, non-metallic, non-shrink, pre-blended and ready to use cement-based grout requiring only the addition of water at project site.

B. Provide non-shrink grout complying with CRD-C621 from a single manufacturer. Consider:

1. Euclid
2. L & M Construction Chemicals, Inc.
3. W. R. Meadows
4. Sika SikaGrout
5. Sonneborn, or approved equal

C. Water: Potable; containing no impurities, suspended particles, algae or dissolved naturalsalts in quantities capable of causing:

1. Corrosion of steel.
2. Volume change increasing shrinkage cracking.
3. Efflorescence.
4. Excess air entraining.

2.2 EPOXY GROUT

A. Epoxy grout shall be used to embed anchor bolts designed for use with epoxy grouts,dowels, and reinforcing steel where specified, and other applications as indicated on Drawings.

B. Provide epoxy grout from a single manufacturer. Consider:

1. Hilti HY 200 or RE 500
2. ITW Ramset/Redhead Epcon C-6
3. Powers Fasteners Power-Fast+, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that preparations for installation of grout are complete.

3.2 PREPARATION

A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by cleaning, brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved.

B. Roughen concrete lightly, but not enough to interfere with placement of grout.

C. Remove foreign materials from metal surfaces in contact with grout.

D. Saturate concrete surfaces with clean water 12 hours prior to grouting. Before placing grout; remove excess or free standing water.

3.3 FORMING

A. Align, level and maintain final positioning of components to be grouted. Forming should allow for a minimum of 1-inch head of grout above bottom of base plates.

B. Provide forms of sufficient strength and securely anchored and shored to withstand pressure of grout and conditions during placement. Fit forms closely together and seal joints.

C. Install formwork with clearances to permit proper placement of grout.

3.4 MIXING

A. Non-Shrink Grout:

1. Mix and prepare non-shrink cementitious grout in accordance withmanufacturer's instructions.

2. Non-shrink grouts shall have a minimum compressive strength of 2,400 psi in 48hours and a minimum 28 day compressive strength of 5,000 psi; shall have no shrinkage (0.0 percent) and a maximum 4.0 percent expansion in the plastic statewhen tested in accordance with ASTM C827; and shall have no shrinkage (0.0 percent) and a maximum of 0.2 percent expansion in the hardened state when tested in accordance with CRD-C621.

B. Epoxy Grout:

1. Mix and prepare epoxy grout in accordance with manufacturer's instructions.

2. Epoxy grout shall develop a compressive strength of 5,000 psi in 24 hours and10,000 psi in 7 days when tested in accordance with ASTM C579, Method B.

C. Mix grout components in proximity to work area and transport mixture quickly and in manner not permitting segregation of materials.

3.5 PLACING NON-SHRINK GROUTS

A. Follow established concreting procedures observing precautions for hot and cold weather concreting.

B. Place grout material quickly and continuously using practical method; poured in place orpressure grouted by gravity or plunger. Do not use pneumatic-pressure or dry-packing methods. When practical, place grout from one side flowing to opposite side to avoid airentrapment.

C. Do not vibrate placed grout mixture, or permit placement when area is being vibrated bynearby equipment.

D. Thoroughly compact final installation and eliminate air pockets.

E. Do not remove forms until grout has taken an initial set and will not slump. Afterremoval, cut off excess grout and finish to a smooth surface.

F. Remove shims or leveling devices after curing for 48 hours.

3.6 PROTECTION

A. Ensure that transport, storage, mixing and application of pre-packaged grout does not damage prepared foundations, adjacent concrete or formworks, or allow contamination ofadjacent stream, reservoir or wetlands with materials or chemicals.

3.7 FIELD QUALITY CONTROL

A. Meet the applicable requirements of Section 01 40 00 – Quality Requirements andSection 01 70 00 – Execution and Closeout Requirements

B. Measurement of Ingredients:

1. Measurements for cement grout shall be made accurately by volume usingcontainers.

2. Shovel measurement shall not be allowed.

3. Prepackaged grouts shall have ingredients measured by means recommended bythe manufacturer.

C. Provide free access to Work area and cooperate with ENGINEER and OWNER, as needed.

D. Field Inspection and Testing will be performed by CONTRACTOR’s Quality Control testing laboratory inaccordance with applicable standards.

END OF SECTION

SECTION 05 55 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for fabricating and installing metal items such as the low-level outlet (LLO) access steel platform, ships ladder, ladder, and other items as shown on the Drawings, or as specified.

B. This section does not include requirements for gates, valves, water supply fabrications, or ancillary components. Refer to Division 40.

1.2 MEASUREMENT AND PAYMENT

A. The basis for measurement and payment is provided in Section 01 22 00 – Price and Payment Procedures.

1.3 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures.

B. Section 01 40 00 – Quality Requirements.

C. Section 09 90 00 – Painting and Coating

1.4 REFERENCES

A. American Institute of Steel Construction (AISC), Code of Standard Practice for Steel Buildings and Bridges.

B. American National Standards Institute (ANSI).

1. ANSI A14.3 – American National Standards for Ladders – Fixed – Safety Requirements.
2. Z49.1, Safety in Welding and Cutting.

C. American Society for Testing and Materials (ASTM)

1. ASTM A36 - Specification for Structural Steel.
2. ASTM A123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 6,000 psi Tensile.
4. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

D. American Welding Society (AWS)

1. B2.1, Welding Procedure and Performance Qualification.
2. D1.1, Structural Welding Code.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 00 - Submittal Procedures.

B. Shop Drawings and product data for all fabricated items. Include:

1. Materials, profiles, sizes, connection attachments, reinforcing, anchorage, hardware, size and type of fasteners and accessories.
2. Assembly drawings, sections, elevations, and details where applicable. Specifically dimension the openings needed for stem, floor stand, railing, davit, and conduit protrusions.
3. Welded connections using standard AWS welding symbols; indicate net weld lengths and proposed field welds.
4. Templates for anchors and bolts specified for installation under other sections.
5. Proposed location of all field welds. Approval required from ENGINEER for all field welds.
6. Coating system or finish.

C. Welder certifications of qualification showing date of qualification; qualification grade and rating; and notarized signature of inspector.

D. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified Professional Engineer responsible for their preparation.

E. Product data: Products used in miscellaneous metal fabrications, including hoist rings, bolts, and drop-in anchors.

F. Mill Certificates: Signed by aluminum, steel, and stainless-steel manufacturers, certifying that products furnished comply with requirements.

G. Welding Certificates:
1. Certify that welders have been qualified under AWS, within previous 12 months, to perform welds required under this Section.

H. Before delivery of materials, provide:
1. Certified laboratory test reports of materials.
2. Paint inspection records.

I. Qualification Data for Professional Engineer.

PART 2 - PRODUCTS

2.1 GENERAL

A. Verify critical dimensions at the jobsite before product fabrication begins. Field fabrication will not be permitted.

B. Delegated Design: Engage a qualified Professional Engineer, as defined in Section 01 40 00 – Quality Requirements, to design ladders.

C. Unless otherwise shown, miscellaneous metalwork of fabricated steel shall be hot dip galvanized after fabrication as specified herein.

2.2 MATERIALS

A. Pipe or Pipe Sleeves: ASTM A53, Schedule 40, black or galvanized.

B. Steel Shapes and Bars: Carbon steel, ASTM A36.

C. Stainless steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.

D. Steel Tubing: ASTM A500, Grade B; ASTM A501, Grade B.

E. Steel Pipe: ASTM A 53/A 53M, Type S Grade B Standard Weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. Unless otherwise noted, provide steel machine bolts for the connection of carbon steel or iron; galvanized steel or stainless-steel machine bolts for the connection of galvanized steel or iron; and stainless-steel machine bolts for the connection of aluminum or stainless-steel.

B. Mechanically Galvanized Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM F 3125, Grade A325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.

C. Stainless steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.

D. Bolt Requirements:

1. The bolt and nut material shall be free-cutting steel.

2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

3. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than 1/2-inch beyond the nut.

E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Provide standard headed bolts with heavy hex nuts and Grade A washers.

2. Where galvanized anchor bolts are indicated or specified, provide standard headed bolts with heavy hex nuts and Grade A washers, galvanize in accordance with ASTM F 2329.

F. Epoxy adhesive anchors are required for drilled anchors where exposed to weather, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails, pumps, mechanical equipment, and reinforcing bars. Epoxy systems shall be Sika/FI System with Sikadur Injection Gel Epoxy or Masterbuilders Concresive Epoxy Cartridge Dispensing System and Concresive Paste LPL. Threaded rod shall be stainless steel Type 316, unless specified otherwise.

G. Unless otherwise shown, glass capsule, polyester resin adhesive anchors will be permitted in locations not specified above and shall be Hilti HV or Molly Parabond. Threaded rod shall be galvanized steel.

2.4 METAL BAR GRATING

A. Provide bar grate platform to the dimensions shown in the Drawings. Bar grating shall be constructed of hot-dip galvanized steel. The height and thickness of grating bearing bars shall be at least those specified in the Drawings. The maximum spacing between bearing bars shall be 15/16 inches. The maximum spacing of cross bars shall be 4”.

B. Gratings shall be banded at the edges. Banding to continue around handrail post openings.

C. Bar grate shall be attached to the concrete structures with stainless steel saddle clips, ½-inch diameter stainless steel bolts, and stainless-steel drop-in anchors. Number and location of saddle clips shall be as per the bar grate manufacturer’s recommendation.

D. No single piece of grating shall weigh more than 80 lbs. unless otherwise specified.

E. The top surface of the grating in the gate house shall be flush with the upper surface of the existing concrete slab. Where grating is supported by recessed concrete, the CONTRACTOR shall design and install a suitable method for shimming those sections to ensure grating is installed plumb and flush.

F. Provide and coordinate openings in grating for handrail posts. Limit of two cut bearing bars per handrail post opening

2.5 METAL LADDERS

A. Railing shall be furnished in the configurations indicated on the Drawings. For metal railing systems, at Contractor's option, handrailing shall be either shop fabricated welded systems or prefabricated non-welded systems designed for field assembly. Either system shall meet the requirements specified herein.

B. All railing systems shall be designed and fabricated in compliance with the most stringent requirements of the applicable local building code, OSHA 29 CFR Part 1926 Subpart R, all other pertinent OSHA regulations, ANSI-A14.3, and local safety regulations.

2.6 RAILING

A. Railing shall be furnished in the configurations indicated on the Drawings. For metal railing systems, at Contractor's option, handrailing shall be either shop fabricated welded systems or prefabricated non-welded systems designed for field assembly. Either system shall meet the requirements specified herein.

B. All railing systems shall be designed and fabricated in compliance with the most stringent requirements of the applicable local building code, OSHA 29 CFR Part 1926 Subpart R, and all other pertinent OSHA regulations and local safety regulations.

C. At a minimum, handrailing and stair railing shall be designed to withstand a uniform horizontal load of 50 lbs per foot applied to the top rail. In addition, handrailing and stair railing shall be designed to withstand a concentrated load of 200 lbs applied in any direction, at any point on the railing system. The 200 lb concentrated load need not be applied simultaneously with the 50 lbs per foot uniform horizontal load.

D. Steel handrailing shall be fabricated from 1-1/2 inch ID pipe, Schedule 40 minimum wall thickness.

E. Kickplates shall be 4 inches high and shall be fabricated from similar materials as the railing. Kickplates shall clear the walking surface by 1/4 inch.

F. Openings in railing shall be guarded by self-closing gates in accordance with OSHA 1910.23.

G. Fabricate items with joints tightly fitted and secured.

H. Fit and shop assemble in largest practical sections for delivery to site.

I. Remove burrs from all exposed cut edges, remove spatter, and grind exposed welds to match adjacent surface.

J. Galvanize in accordance with the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

A. Examine surfaces for defects which would impair installation.

B. Clean, inspect, and repair as necessary all existing structure surfaces to be in contact with metal fabrications and components.

C. Obtain ENGINEER's approval before site cutting, field welding, or making nonscheduled adjustments.

D. Clean steel items to bare metal where site welding is scheduled.

E. Provide for erection loads with temporary bracing; keep Work in alignment.

F. Supply setting templates for items required to be cast into concrete.

G. Paint all concrete surfaces to be in contact with steel or aluminum as required below.

3.3 DELIVERY, STORAGE, AND HANDLING

A. Accept metal fabrications on site in labeled shipments. Inspect for damage. The CONTRACTOR shall repair or replace damaged items at no additional cost to the OWNER.

3.4 FABRICATION

A. Fit and shop assemble items in largest practical sections for delivery to site. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flathead (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated, coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

3.5 WELDING

A. Method: All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

B. Quality: In assembly and during welding, the component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS Code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface. All sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

C. Inspection and Testing: All welds shall be inspected following criteria outlined in the applicable AWS standard by a certified inspector. When the applicable AWS standard does not explicitly state minimum weld testing requirements, coordinate with the ENGINEER for the required level of testing for each fabricated item. Submit all NDT results to the ENGINEER for review and approval.

3.6 FABRICATION TOLERANCES

A. Unless stated otherwise by the manufacturer, all fabrications shall conform to the following tolerances:

1. Squareness: 1/16 inch maximum difference in diagonal measurements
2. Maximum Offset Between Faces: 1/16 inch
3. Maximum Misalignment of Adjacent Members: 1/16 inch
4. Maximum Bow: 1/8 inch in 48 inches
5. Maximum Deviation from Plane: 1/16 inch in 60 inches or 1/8 inch over the entire face

3.7 INSTALLATION

A. Provide anchor bolts and manufacturer's templates as required; install in accordance with manufacturer's published instructions and as shown on the Drawings.

B. Install items plumb and level, accurately fitted, and free from distortion or defects.

C. The top surface of the grating in the gate house shall be flush with the upper surface of the existing concrete slab. Where grating is supported by recessed concrete, the CONTRACTOR shall design and install a suitable method for shimming those sections to ensure grating is installed plumb and flush.

D. All grating sections shall be adequately supported and installed such that their top surfaces are flush and plumb with adjacent sections.

E. Field welding of metal fabrications is not allowed unless noted in the Drawings or approved by the ENGINEER. Perform field welding in accordance with AWS D1.1.

F. After installation, touch-up field welds and scratched or damaged painted surfaces in accordance with Section 09 90 00.

G. Field repairs to galvanizing shall be made using "Galvinox," "Galvo-Weld," or equal.

H. Steel Contacting Exposed Concrete or Masonry: Apply two coats bituminous paint (Carboline Bitumastic 300M or equal).

I. Obtain approval of Design Engineer prior to site cutting or adjusting not scheduled.

J. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions. Holes shall be roughened with a brush on a power drill, cleaned and dry. Drilled anchors shall not be installed until the concrete has reached the specified 28-day compressive strength. Adhesive anchors shall not be loaded until the adhesive has reached its specified strength in accordance with the Manufacturer's instructions.

3.8 CLEANING AND FINISHES

A. Meet final cleaning requirements of Section 01 70 00 – Execution and Closeout Requirements.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation and field application of paints, and other coatings.

B. The following surfaces shall not be coated:

1. Concrete
2. Stainless steel
3. Electrical conduit
4. Machined surfaces
5. Equipment nameplates
6. Any other surface not expressly identified to be coated by the Contract Documents

C. The coating areas are identified on the Drawings.

D. Definitions of terms used in this Section are in accordance with definitions referenced in ASTM D16, ASTM D3960, and SSPC Glossary of Definitions.

E. Related Requirements:

1. Section 05 50 00 - Metal Fabrications.

1.2 REFERENCE STANDARDS

A. References herein to “SSPC Specifications” or “SSPC” shall mean the published standards of the Steel Structures Painting Council

B. References herein to “NACE” shall mean the published standards of the National Association of Corrosion Engineers

C. ASTM International:

1. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
3. ASTM D1002 - Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).
4. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test.
5. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
6. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
7. ASTM G8 – Standard Test Methods for Cathodic Disbonding of Pipeline Coatings.

1.3 SEQUENCING

A. Section 01 10 00 - Summary: Requirements for sequencing

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures

B. Include color chart in submittals such that Owner may select the color of all protective coatings.

C. Product Data:

1. Physical properties of coatings, including the following:
   a. Solids content
   b. Ingredient analysis
   c. VOC content
   d. Temperature resistance
   e. Typical exposures and limitations
   f. Manufacturer's standard color chips

2. Coating System Manufacturer's current printed recommendations and product data sheets for coating systems, including:
   a. Surface preparation recommendations
   b. Method of application
   c. Compatible primer type and thickness
   d. Maximum dry and wet-mil thickness per coat and number of coats
   e. Minimum and maximum curing time between coats, including atmospheric conditions for each
   f. Curing time before submergence in liquid
   g. Approved thinner to be used for each coating
   h. Ventilation requirements for field coating
   i. Minimum and maximum atmospheric conditions during which the paint may be applied
   j. Required protection from sun, wind, and other weather conditions
   k. Maximum allowable substrate moisture content
   l. Requirements for transportation and storage
   m. Mixing instructions
   n. Storage requirements and shelf-life
   o. Material pot life
   p. Touch-up requirements and limitations
   q. Minimum adhesion of each system submitted in accordance with ASTM D4541
   r. Material safety data sheets for each product

D. Test Reports:

1. Results of testing on coating systems recommended by manufacturer and required by this section, including at least the following:
   a. Visual inspection reports
   b. Film thickness testing reports
   c. Holiday detection reports
   d. Adhesion testing reports

2. Manufacturer certifications that coating passed tests

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals

B. Operation and Maintenance Data: Submit information on cleaning, touchup, and repair of painted and coated surfaces.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials

B. Extra Stock Materials:

1. Furnish 1 gal. of each color and type as provided for Project.

2. Label each container with manufacturer's label, color, type, texture and installation location.

3. Store where directed by Owner.

1.7 QUALITY ASSURANCE

A. General: The Contractor shall give the Engineer a minimum of 7 days advance notice of the start of any field surface preparation work or coating application work, and a minimum of 7 days advance notice of the start of any shop surface preparation work.

B. Inspection by the Engineer, or the waiver of inspection of any particular portion of the work, shall not relieve the Contractor of its responsibility to perform the work in accordance with these Specifications.

C. Scaffolding shall be erected and moved to locations where requested by the Engineer to facilitate inspection. Additional illumination shall be provided to cover all areas to be inspected.

D. Surface Preparation: Evaluation of blast cleaned surface preparation work will be based upon comparison of the blasted surfaces with the standard samples available from SSPC.

E. Film Thickness Testing:

1. On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC "Paint Application Specification No.2" using a magnetic-type dry film thickness gauge such as Mikrotest model FM, Elcometer model 111/1 EZ, or equal.

2. Each coat shall be tested for the correct thickness and reported to the Engineer. No measurements shall be made until at least 8 hours after application of the coating.

3. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.

F. Store materials in well-ventilated, enclosed structures, and protect from weather and excessive heat or cold in accordance with the manufacturer's recommendations

1. Store flammable materials in accordance with federal, state, and local requirements.

2. Store rags and cleanup materials appropriately to prevent fire and spontaneous combustion.

3. Store and dispose of hazardous waste in accordance with federal, state, and local requirements. This requirement specifically applies to waste solvents and coatings.

G. Do not use contaminated, outdated, diluted materials, and/or materials from previously opened containers and immediately remove these items from the project site once discovered

H. Warranty Inspection: A warranty inspection may be conducted during the eleventh month following completion of all coating and painting work. The Contractor and a representative of the coating material manufacturer shall attend this inspection. All defective work shall be repaired in accordance with these specifications and to the satisfaction of the Owner. The Owner may, by written notice to the Contractor, reschedule the warranty inspection to another date within the one-year correction period, or may cancel the warranty inspection altogether. If a warranty inspection is not held the Contractor is not relieved of its responsibilities under the Contract Documents.

1.8 QUALIFICATIONS

A. Applicator: Company specializing in performing Work of this Section with minimum three years' documented experience working with products from proposed manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Container Labeling: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

B. Inspection:

1. Accept materials on Site in manufacturer's sealed and labeled containers.

2. Inspect for damage and to verify acceptability.

C. Store materials in ventilated area and otherwise according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

2. Provide additional protection according to manufacturer instructions.

1.10 AMBIENT CONDITIONS

A. Meet the requirements of the manufacturer for ambient conditions during both storage and application.

1.11 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties

PART 2 - PRODUCTS

2.1 GENERAL

A. The term "paint," "coatings," or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and all other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.

B. The term “DFT” means minimum dry film thickness, with no negative tolerance.

C. Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer, all of which shall be plainly legible at the time of use.

D. The Contractor shall use coating materials suitable for the intended use and recommended by their manufacturer for the intended service.

E. In any coating system, only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, subject to the approval of the Engineer, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.

F. All colors and shades of colors of all coats of paint shall be as selected or specified by the Owner. Each coat shall be of a slightly different shade, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the Owner. Finish colors of connecting pipe and equipment shall match unless otherwise approved by the Engineer.

G. Products shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. Where requested, the Contractor shall provide the Engineer with the names of not less than 10 successful applications of the proposed manufacturer's products demonstrating compliance with this specification requirement

2.2 PAINTS AND COATINGS

A. These protective coating systems apply to general configurations throughout the project. Modifications to protective coatings employed may include a combination of various lining or coating systems and products defined in this section, to meet the needs of the installation and exposure conditions of the process, structure, or component to be coated.

B. Structural Steel:

1. Galvanized: ASTM A123, hot dip galvanized after fabrication. See Section 05 50 00 - Metal Fabrications for additional information on specific elements of the project.

C. Low Level Outlet Pipes and Slide Gate Rehabilitation:

1. Modified Polyamine Epoxy Lining
   a. Coating: 100 percent solids, high-build epoxy for coating of steel in immersion service
   b. Product shall be demonstrated as suitable for coating steel pipe in immersion service and having a fast cure time suitable for the application conditions.

2. Product, or approved equal:
   a. Epoxoline Series 22, as manufactured by Tnemec

3. Coating system details:
   a. Surface preparation: SSPC-SP10 or as required by the manufacturer, whichever is more stringent
   b. Primer and subsequent coats: as required by the manufacturer and to meet minimum DFT requirements
   c. Total system minimum DFT: 30 mils

D. Wall thimbles

1. Epoxy Mastic and Finish
   a. High-build, surface tolerant epoxy, for metal substrates in immersion service.
   b. Product shall be demonstrated as suitable for coating metal substrates in areas where low temperatures, damp surfaces, and over-dew-point conditions are present.
   c. No standing water shall be allowed on the surfaces to be coated.

2. Product, or approved equal:
   a. Prime Coat: Protuff Mastic Series 132, as manufactured by Tnemec
   b. Finish Coat: Protuff Series 138, as manufactured by Tnemec

3. Coating system details:

a. Surface preparation: SSPC-SP10 or as required by the manufacturer, whichever is more stringent
b. Maintain appropriate recoat windows and prepare prime coat surface as required for finish coat application, according to manufacturer recommendations.
c. Coating number as required to meet minimum DFT requirements.
d. Prime Coat DFT: 10-15 mils
e. Finish Coat DFT: 5-10 mils
f. Total System DFT: 15-25 mils

E. General Metals:

1. Fusion bonded epoxy coating:
   a. Thermosetting, fusion bonded dry powder epoxy, 100 percent solids, with the following performance characteristics when applied:
      1) Cathodic disbondment resistance: Average maximum 48 millimeters when tested in accordance with ASTM G8
      2) Adhesion shear resistance: Minimum 4,700 pounds per square inches when tested in accordance with ASTM D1002
   b. Fuse coating according to manufacturer's recommendations

2. Manufacturers:
   a. 3M
   b. Morton Thiokol

3. Coating system details:
   a. Surface preparation: SSPC-SP10
   b. Prime Coat DFT: N/A
   c. Intermediate Coat DFT: N/A
   d. Finish Coat DFT: 3-5 mils
   e. Total System DFT: 3-5 mils

PART 3 - EXECUTION

3.1 STORAGE, MIXING, AND THINNING OF MATERIALS

A. Manufacturer's Recommendations: Unless otherwise specified herein, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for all other procedures relative to coating shall be strictly observed. The Contractor shall supply the Engineer with copies of each manufacturer's instructions in accordance with the requirements of Section 01 33 00 – Submittal Procedures and this section.

B. All protective coating materials shall be used within the manufacturer's recommended shelf life.

C. Storage and Mixing: Coating materials shall be protected from exposure to cold weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together.

3.2 PREPARATION FOR COATING

A. General: All surfaces to receive protective coatings shall be cleaned as specified herein prior to application of said coatings. The Contractor shall examine all surfaces to be coated and shall correct all surface defects before application of any coating material. All marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any coating application.

B. Protection of Surfaces Not to be Coated: Surfaces which are not to receive protective coatings, or adjacent work, shall be protected during surface preparation, cleaning, and coating operations.

C. All hardware, lighting fixtures, switch plates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked, or otherwise protected.

D. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of all mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

E. Spray painting shall be conducted under carefully controlled conditions. The Contractor shall be fully responsible for and shall promptly repair any and all damage to adjacent work or adjoining property occurring from blast cleaning or coating operations.

F. Erect and maintain protective enclosures in accordance with SSPC-Guide 6.

3.3 PROTECTION OF PAINTED SURFACES: CLEANING AND COATING SHALL BE SO PROGRAMMED THAT DUST AND OTHER CONTAMINANTS FROM THE CLEANING PROCESS WILL NOT FALL ON WET, NEWLY COATED SURFACES.

3.4 WHENEVER POSSIBLE, COORDINATE WITH OTHER TRADES AND COMPLETE SURFACE PREPARATION AND COATING WORK BEFORE INSTALLING HARDWARE, HARDWARE ACCESSORIES, NAMEPLATES, DATA TAGS, ELECTRICAL FIXTURES, AND SIMILAR UNCOATED ITEMS THAT WILL BE IN CONTACT WITH COATED SURFACES. REINSTALL REMOVED ITEMS AFTER COATING.

A. Replace identification markings on mechanical or electrical equipment when coated over or spattered.

B. Remove grilles, covers, and access panels for mechanical and electrical system and coat separately.

3.5 GENERAL SURFACE PREPARATION

A. Prepare surfaces in accordance with coating manufacturer's instructions unless more stringent requirements are specified in this Section.

B. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam

2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing

3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding

4. White Metal Blast Cleaning (SSPC-SP5): Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products, and foreign matter by blast cleaning

5. Commercial Blast Cleaning (SSPC-SP6): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area

6. Brush-Off Blast Cleaning (SSPC-SP7): Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint

7. Near-White Blast Cleaning (SSPC-SP10): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area

3.6 SURFACE PREPARATION OF OTHER SURFACES

A. Galvanized steel and non-ferrous metal surfaces:

1. Degrease or solvent clean (SSPC-SP 1) to remove oily residue.

2. Abrasive blast clean in accordance with SSPC-SP6.
   a. If abrasive blast cannot be performed, abrade in accordance with SSPC-SP3.

3. Apply metal pretreatment within 24 hours before coating galvanized surfaces that cannot be thoroughly abraded, such as bolts, nuts, or preformed channels.

4. Test surface for contaminants using copper sulfate solution.

3.7 WORKMANSHIP

A. Skilled craftsmen and experienced supervision shall be used on all work.

B. Clean drop cloths shall be used. All damage to surfaces resulting from the work hereunder shall be cleaned, repaired, and refinished to their original condition.

C. All coatings shall be applied under dry and dust-free conditions. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness.

D. Edges, corners, crevices, and joints shall receive special attention to ensure that they have been thoroughly cleaned and that they receive an adequate thickness of coating material.

E. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding.

F. Installations shall be protected by the use of drop cloths or other approved precautionary measures.

3.8 SHOP COATING REQUIREMENTS

A. Unless otherwise indicated, all items of equipment shall be shop primed and shop finish coated with the specified or approved color. The methods, materials, application equipment, and all other details of shop painting shall comply with this section. Provide products and services as required for touch-up painting after installation.

B. For certain small pieces of equipment, the manufacturer may have a standard coating system which is suitable for the intended service conditions. In such cases, the final determination of suitability will be made during review of the shop drawing submittals. Equipment of this type generally includes only indoor equipment such as instruments, small compressors, and chemical metering pumps.

C. Shop painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 2 months before top coated, or less time if recommended by the coating manufacturer.

D. Damage to shop-applied coatings shall be repaired in accordance with this Section and the coating manufacturers printed instructions.

E. The Contractor shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this Section. Copies of applicable coating manufacturer's data sheets shall be submitted with equipment shop drawings.

3.9 APPLICATION OF COATINGS

A. The application of protective coatings to steel substrates shall be in accordance with "Paint Application Specification No.1, (SSPC-PA 1)," Steel Structures Painting Council.

B. Cleaned surfaces and all coats shall be inspected prior to each succeeding coat. The Contractor shall schedule such inspection with the Owner in advance.

C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same working day.

D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations, and this Section, whichever has the most stringent requirements.

E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe painting for these areas.

F. Special attention shall be given to materials which will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.

G. Finish coats, including touch-up and damage repair coats shall be applied in a manner which will present a uniform texture and color matched appearance.

H. Coatings shall not be applied under the following conditions:

1. Temperature exceeding the manufacturer's recommended maximum and minimum allowable.
2. Dust or smoke laden atmosphere.
3. Damp or humid weather.
4. When the substrate or air temperature is less than 5 degrees F above dewpoint.
5. When air temperature is expected to drop below 40 degrees F or less than 5 degrees F above the dewpoint within 8 hours after application of coating.

I. Dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychometric tables.

J. Allow surfaces to dry, except where coating manufacturer requires surface wetting before coating.

K. Spray application:

1. With a brush, stripe coat edges, welds, corners, nuts, bolts, and difficult-to-reach areas, as necessary, before spray application to ensure specified coating thickness along edges.
2. When using spray application, apply each coat to thickness no greater than recommended in coating manufacturer's instructions.
3. Use airless spray method unless air spray method is required by the coating manufacturer's instructions or these Specifications.

4. Conduct spray coating under controlled conditions. Protect adjacent construction and property from coating mist, fumes, or overspray.

L. Leave no holidays. Repair all holidays in accordance with the requirements on pertinent Coating Detail Sheets or as recommended by the manufacturer.

M. Sand and feather into a smooth transition and recoat scratched, contaminated, or otherwise damaged coating surfaces so repairs are invisible to the naked eye.

3.10 CURING OF COATINGS

A. The Contractor shall provide curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this Section, whichever is the highest requirement, prior to placing the completed coating system into service.

B. Adhesion confirmation: Perform adhesion tests after proper coating cure in accordance with ASTM D3359. Demonstrate that:

1. Prime coat adheres to the substrate.

2. Coatings adhere to the prime and intermediate coats.
   a. Coating 5 mils or more DFT: Achieve adhesion test result of 5A on immersed surfaces and 4A or better on other surfaces.
   b. Coating less than 5 mils DFT: Achieve adhesion test results of 5B on immersed surfaces and 4B or better on other surfaces.

3.11 CORRECTION OF DEFECTIVE WORK

A. Recoat areas not meeting the required system DFT. Follow manufacturer recommendations for applying additional coats, including additional surface preparation if the manufacturer's recoat window is passed. Recheck parts to ensure the specified minimum DFT is achieved.

B. Repair pinholes or holidays identified by Holiday Testing as follows:

1. Remove the coating system with a grinder or other suitable power tool.

2. Remove coating system at all pinholes and holidays at least 2 inches diameter around the defect back to expose substrate.

3. Concrete voids: chip back to expose entire cavity in all directions.

C. Completely fill void with approved filler/surfacer material using a putty knife or other suitable tool and strike off. Cure per coating manufacturer's recommendations.

1. Aggressively abrade or sand the intact coating system surface at least 3 inches beyond the removal area in all directions to produce a uniform 6- to 8-mil profile in the intact coating system.

2. Vacuum the prepared area to remove all dust, dirt, etc., leaving clean, sound surfaces.

3. Tape to mask the periphery of the prepared intact coating area to prevent coating repair application onto the prepared area.

4. Apply the coating system with enough coats to achieve the specified finish coat thickness over the defect and coating removal area. Feather the coating onto the abraded coated surfaces around the removal area to avoid a lip and to achieve a neat repair outline.

5. Follow curing time between coats as specified by coating manufacturer for the site conditions. Solvent wash and abrasive blast per coating manufacturer instructions if the maximum recoat time is exceeded.

6. Apply coating at specified dry film thickness.

3.12 FINAL INSPECTION

A. Conduct final inspection with Owner to ensure work conforms to contract documents requirements and the requirements of this section.

1. Mark any rework required.
   a. Re-clean and repair, as specified, at no additional cost to the Owner.

END OF SECTION

SECTION 40 05 57

ACTUATORS FOR PROCESS VALVES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Electric motor actuators for slide gates.

B. Related Requirements:

1. Section 01 33 00 - Submittal Procedures
2. Section 01 70 00 - Execution and Closeout Requirements
3. Section 40 05 59.23 - Stainless Steel Slide Gates

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C542 - Electric Motor Actuators for Valves and Slide Gates.

1.3 COORDINATION

A. Coordinate Work of this Section with installation of slide gates and accessories as outlined in Section 40 05 59.23 - Stainless Steel Slide Gates and the Drawings.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals

B. Provide a complete list/schedule of all actuators being provided with their associated tag names as indicated on the Gate Schedule and the size of the gate they are actuating.

C. Product Data: Submit manufacturer information for actuator with model number and size indicated. Also include, at a minimum:

1. Electrical ratings:
   a. Voltage and number of phases
   b. Starting and running current
   c. Voltage levels and source for control and status
2. Description of integral control interface
3. Gear ratios for both manual and motorized actuation
4. Opening and closing directions
5. Allowable starts per hour
6. List of all included options and accessories
7. Full travel times
8. Gearbox data including gear ratio and gearbox efficiency
9. Environmental ratings, including NEMA enclosure rating

D. Shop Drawings:

1. Wiring diagrams:

a. Complete wiring diagrams and control system schematics.
b. Include all options and expansion cards furnished with each actuator.

2. Dimensioned drawings of each gate and actuator combination

3. Electric motor data

4. Submit actuator Shop Drawings with gate submittal.

E. Calculations:

1. Operating torque

2. Maximum torque calculations for seating and unseating

3. Maximum operating torque at starting and normal operation

4. Signed by Professional Engineer, licensed in the state of Texas

F. Provide draft vendor operation and maintenance manual:

1. Include a list of all configurable parameters, and the final values for each.

2. Include a troubleshooting chart covering the complete controls/electrical power systems, showing description of trouble, probably cause, and suggested remedy.

G. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

H. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

I. Commissioning Submittals:

1. Provide Manufacturer’s Certificate of Source Testing as specified in Section 01 70 00 - Execution and Closeout Requirements.
a. Affidavit in accordance with AWWA C542

2. Provide Manufacturer’s Certificate of Installation and Functionality Compliance.

J. Closeout Submittals:

1. Provide final vendor operation and maintenance manual.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.

3. Provide additional protection according to manufacturer instructions.

1.6 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.

2. Indicate field measurements on Shop Drawings.

1.7 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties

1.8 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis

B. Provide shop inspection and testing of completed assemblies.

PART 2 - PRODUCTS

2.1 ELECTRIC MOTOR ACTUATORS

A. Manufacturer:

1. Auma Actuators Inc.

B. Description:

1. Comply with AWWA C542.
2. Provide actuators complete and operable with all components and accessories required for operation.
3. Power supply:
   a. Voltage and phases as indicated on the Gate Schedule
   b. Gate motion independent of power supply phase rotation
   c. Provide an internal backup power source to maintain settings and track gate position when main power is off.
   d. The actuators shall incorporate all major components such as the motor, starter, local controls, terminals etc. housed within a self-contained, sealed enclosure.
4. Size actuator to move gates from full open to closed position within the time indicated in the Schedule:
   a. If an operating time is not indicated on the Schedule, size the actuator to move gates at minimum 12 inches per minute under maximum load.
   b. Size actuators so that gear boxes are not required where possible.
5. Materials:
   a. Construct motorized actuators of materials suitable for the environment in which the gate is to be installed.
6. Components:
   a. Motors:
      1) Specifically designed for gate actuator service with high starting torque, totally enclosed non-ventilated construction.
      2) Torque ratings equal to or greater than that required for gate seating and dynamic torques with a 25 percent factor of safety:
      3) Motor shall be suitable for operation with voltage, phase, and horsepower and indicated in the gate schedule and Section 40 05 59.23 - Stainless Steel Slide Gates
      4) Provide two Class B thermal contacts or solid-state thermistors embedded within the motor windings in order to protect against over-temperature damage.
      5) Provide bearings of the ball type and provide thrust bearings where necessary.
      6) Provide the bearings with suitable seals in order to confine the lubricant and to prevent the entrance of dirt and dust.
      7) Provide watertight motor conduit connections.
      8) Provide the motor with a space heater suitable for operation on a 120-volt, single-phase, 60-Hz circuit, unless the entire actuator is of a hermetically sealed,

non-breathing design with a separately sealed terminal compartment which prevents moisture intrusion.

b. Design requirements for slide gates:
   1) Design actuators for maximum operating torque, in accordance with and using safety factors required in AWWA C542, but not less than 1.5 times the maximum torque required to open or close the gate, including seating and unseating.
   2) Design for the maximum torque and thrust running load over the full cycle.
   3) Maximum torque or thrust rating: The actuator stall torque or maximum thrust output shall not exceed the torque or thrust capability of the gate, as determined by the gate manufacturer.

7. Enclosures:
   a. Actuator housing ratings as appropriate for their environmental conditions or as indicated on the Drawings.
   b. Stainless steel external fasteners.

8. Manual actuators:
   a. Hand wheel for manual operation:
      1) Maximum 80 pound pull on rim when operating gate under maximum load.
   b. Declutch lever: Pad lockable, capable of mechanically disengaging motor and related gearing and freeing hand wheel for manual operation.

9. Gearing: Hardened alloy steel spur or helical gears and self-locking, alloy bronze worm gear set:
   a. Accurately cut to minimize backlash.

10. Enclosure:
    a. Lockable, NEMA 3R enclosure or Engineer approved equivalent.
    b. Mount at deck level, or integral with actuator body.

11. Limit Switches:
    a. Type: Heavy duty, open contact.
    b. Actuation: Rotor cam.
    c. The torque switch shall be activated by a mechanical torque, developed in the seating of valve or gate, or by an obstruction met in the opening and closing of the valve or gate.
    d. Provide an adjustable torque setting, functioning without the use of auxiliary devices or relays.
    e. Provide position limit switches and associated gearing as an integral part of the actuator.
    f. Switches shall not be subject to breakage or slippages due to over-travel.

C. Coordination:

1. Verify in writing that motorized operators are adequately sized for the proposed gates and the operating conditions and safety factors indicated in the drawings and specifications.

2. Gate supplier shall machine the stem nuts, provide proper mounting adaptation, and adaptation hardware to ensure adequate interface between the motorized operators and the slide gates.

PART 3 - EXECUTION

3.1 GENERAL

A. Position visual indicators so that they are most easily visible.

B. Actuators shall be located to be readily accessible for operation and maintenance, without obstructing walkways at the locations indicated on the Drawings.

C. Actuators shall not be mounted where shock or vibrations will impair their operation, nor shall the support systems be attached to handrails, process piping, or mechanical equipment.

3.2 INSTALLATION

A. Securely mount actuators to gate pedestals and make all connections and orientations according to the drawings and the manufacturers written installation instructions.

3.3 COMMISSIONING

A. Section 01 70 00 - Execution and Closeout Requirements.

B. Manufacturer services:

1. Provide certificates:
   a. Manufacturer's Certificate of Source Testing: Proof-of-Design and Performance Test Reports in accordance with AWWA C542.
   b. Manufacturer's Certificate of Installation and Functionality Compliance.
2. Manufacturer's Representative onsite requirements:
   a. Installation: 2 days minimum
   b. Functional Testing: 2 days minimum
3. Training:
   a. Maintenance and Operation: 1 day

C. Source testing:

1. Design and Performance Test Reports in accordance with AWWA C542
2. Test each actuator with a simulated load:
   a. Simulate a typical gate load.

D. Functional testing:

1. As required in the associated equipment specification being actuated, but not less than two full cycles of any gate, monitoring and recording all operating data during testing.
   a. Submit results to Owner.

END OF SECTION

SECTION 40 05 59.23

STAINLESS STEEL SLIDE GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Fabricated stainless steel slide gates.

B. Provide gates as indicated in the Gate Schedule as required by the Drawings.

C. Related Requirements:

1. Section 40 05 57 - Actuators for Process Valves and Gates

1.2 REFERENCES

A. American Water Works Association (AWWA):

1. C561 - Fabricated Stainless Steel Slide Gates

B. ASTM International (ASTM):

1. A276 - Stainless Steel Bars and Shapes
2. B584 - Copper Alloy Sand Castings for General Application
3. D1248 - Polyurethane Plastics Extrusion Materials for Wire and Cable
4. D2000 - Rubber Products in Automotive Applications
5. D4020 - Ultra-High Molecular-Weight Polyethylene Molding and Extrusion Materials

C. American Welding Society (AWS):

1. D1.6 - Structural Welding Code – Stainless Steel

1.3 DEFINITIONS

A. Operating (Design) Head: Distance from centerline of gate to maximum water level of channel.

B. Seating head: Pressure applied to gate slide from weight of water column above gate invert that forces gate slide into seat.

C. Unseating head: Pressure applied to gate slide from weight of water column above gate invert that forces gate slide away from seat.

D. Slenderness ratio (l/r): The largest ratio obtained by dividing the unsupported length of the stem by the radius of gyration of the stem cross section.

1.4 SUBMITTALS

A. Submit as specified in Section 01 33 00 - Submittal Procedures including product data.

B. Shop drawings:

1. Layout and installation drawings for each gate size and type
2. Complete bill of materials
3. Connection design
4. Calculations:

a. Submit calculations and design data substantiating conformance with the Drawings and Specifications.
b. Gate opening and closing thrust forces that will be transmitted to the support structure with operator at extreme positions and load.
c. Stem sizing and support spacing.
d. Torque required to open and close the gate, including maximum torque at any point along gate travel. Indicate thrust value and stem factor.
e. Breakaway torque from seat. Indicate thrust value and stem factor.
f. Design of gate pedestal and fabricated steel bracket for mounting pedestal to existing concrete structure, appropriate for the loads determined above.
    1) Reuse of existing bracket and anchors may be allowed if demonstrated suitable based on gate loads.

C. Submit field inspection report detailing existing conditions and proposed preparation and repair procedures for items to be reused.

D. Provide certification from both the operator manufacturer and the gate manufacturer confirming that the proposed stem configuration has been coordinated with the operator selection.

E. Provide detailed performance test procedures for factory and field testing.

F. Provide vendor operation and maintenance manuals.

G. Commissioning submittals:

1. Provide Manufacturer’s Certificate of Installation and Functionality Compliance as specified in Section 01 70 00 - Execution and Closeout Requirements.

1.5 QUALITY ASSURANCE

A. Factory markings: Mark gates according to the Gate Schedule on the Drawings.

B. Manufacturers qualifications:

1. Company specializing in manufacturing products specified in this Section with minimum five years' documented experience, and able to submit evidence of satisfactory operation in at least five different installations.

2. Manufacturer’s shop welds, welding procedures, and welders: Qualified and certified in accordance with the requirements of AWS D1.6.

3. Assembled gates: Shop inspected, adjusted, and tested before shipping.

C. Installers Qualifications:

1. Company specializing in performing Work of this Section with minimum five years' documented experience and approved by manufacturer.

D. Licensed Professionals Qualifications:

1. Professional Engineer experienced in design of specified Work and licensed in State of Texas.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Provide additional protection according to manufacturer instructions.

1.7 WARRANTY

A. Furnish warranty as specified in Section 01 70 00 - Execution and Closeout Requirements.

1.8 DESIGN REQUIREMENTS

A. Except as modified or supplemented in this section, all gates and operators shall conform to the requirements of AWWA C561, latest edition.

B. Gate components:

1. Frames:
   a. Design for the operating head scheduled with a minimum safety factor of 5, with regard to ultimate tensile, compressive, and shear strength.

2. Stem: Select stem diameter, stem guide quantity and stem guide spacing based on following criteria:
   a. Slenderness ratio (l/r): Shall not exceed 200.
   b. Maximum diameter: Provide stem guides at a spacing to maintain stem diameter of 3 inches or less.
   c. Tensile strength: Suitable to withstand the force generated by the operator with the application of a 200-pound force applied to the handwheel or a 250-foot-pound torque applied to the wrench nut.
   d. Compressive strength:
      1) Suitable to withstand buckling due to the force generated by the operator with the application of an 80-pound force applied to the handwheel or a 100-foot-pound torque applied to the wrench nut.
      2) Determine buckling load using Euler Column formula in accordance with AWWA C561, where C = 2.

3. Thrust nut: Suitable to withstand thrust developed by operator with the application of a 40-pound force on the handwheel with safety factor of 5. Base design on ultimate strength of material used.

4. Slide:
   a. Deflection shall be less than or equal to 1/1000 of the span of the gate or 1/16 inch, whichever is less, when under the design head.
   b. Design for the maximum design head specified with a minimum safety factor of 5, with regard to ultimate tensile, compressive, and shear strength.

5. Operating Head:
   a. See the Drawings and Gate Schedule for seating and unseating head requirements.

1.9 PERFORMANCE REQUIREMENTS

A. Maximum allowable leakage shall be 0.05 gallons per minute per foot of sealing perimeter, half the allowable limit set forth in AWWA C561.

PART 2 - PRODUCTS

2.1 DESCRIPTION

A. Non-self-contained, wall mounted stainless steel slide gate

B. Comply with AWWA C561

C. Size and quantity: As indicated on the Drawings Gate Schedule

D. Operating head: As indicated on the Drawings Gate Schedule

2.2 MANUFACTURERS

A. Whipps, Series 955

1. Or Engineer approved equivalent

2.3 MATERIALS

A. Stainless steel: ASTM A276, Type 316L:

1. Components or structural shapes which are welded: ASTM A276, Type 316L

2. All wetted and unwetted parts including all fasteners and hardware, except as specified in this Section, shall be stainless steel.

B. Ultra-high molecular weight polyethylene: ASTM D1248 and D4020

C. Neoprene: ASTM D2000, Grade 2 BC 510

D. Manganese bronze: ASTM B584, UNS Number C86500 or Alloy 432

E. Silicon bronze: ASTM B584, UNS Number C87300

2.4 COMPONENTS

A. Slide:

1. Type 316L stainless steel

2. Rectangular or square

3. Fabricated with a flat plate reinforced with formed plates or structural members

B. Frame:

1. Construct gate frame of Type 316L stainless steel structural members or formed plate welded to form a rigid 1-piece frame.

2. Mounting: As indicated on the Drawings

3. Adjustable ultra-high molecular weight polyethylene pressure pads

4. Allow replacement of top, side, and bottom seals without removing the gate from the mounting surface.

C. Guides:

1. Type 316L stainless steel with ultra-high molecular weight polyethylene insert in contact with gate

2. Minimum face width of 1 inch

3. Length: To support the slide fully in the open position

4. Anchor bolts shall not pass through the guides and seals.

5. Provide brackets to support guides where not mounted to face of concrete.

D. Seals:

1. Designed to achieve the specified leakage requirements

2. Sealing and sliding surfaces shall provide a low coefficient of friction with the surface of the slide.

3. Field replaceable without removing gate from concrete or wall thimble

4. Anchor bolts shall not pass through the guides and seals.

5. J-bulb, P type, neoprene crown, or elastomer seals are not acceptable.

6. Minimum seating surface width: 3/4 inch in contact with slide

7. Bottom seal:
   a. Resilient Viton, minimum durometer of 45
   b. Attached to the bottom of the slide or embedded in gate frame invert

8. Side and top seals: Provide one of the seal design alternatives listed below:
   a. Alternative A:
      1) Viton™ crown seal with UHMWPE bearing bars
      2) Attached to the slide with Type 316 stainless steel fasteners
      3) Crown seal shall be actuated by water pressure in either the seating or unseating direction.
      4) Primary contact with the slide shall be through the UHMWPE bearing bar. The neoprene shall not be solely relied upon for the contact seal.
      5) Seal compression may be maintained by UHMWPE field adjustable pressure pads mounted to the guide with Type 316 stainless steel fasteners.
   b. Alternative B:
      1) UHMWPE self-adjusting type seals: Utilize a continuous compression cord to ensure contact between the seals and the slide.
      2) Side seals: Attach to frame using one of the following approaches:
         a) Held in place between the front and back angles of the guide with Type 316 stainless steel bolts passing through the guide and seal along the length of the guide
         b) Held in place between front and back of a formed, one-piece, rigid channel guide. Attach seals to frame using Type 316 stainless steel bolts
      3) Design and installation shall provide access to and removal of the bolt to allow removal of the side seal without removing the gate from the concrete.
      4) Top Seal: UHMWPE self-adjusting type seal with double compression cord

E. Stem:

1. Type 316 stainless steel

2. Machine cut or rolled threads

3. Stem couplings:
   a. Silicon bronze or Type 316 stainless steel
   b. Threaded and keyed to stem or threaded and bolted to stem

4. Stem guides:
   a. Type 316 stainless steel
   b. Split collar
   c. Adjustable in 2 directions
   d. Ultra-high molecular weight polyethylene bushing
   e. Located as shown on the Drawings

5. Provide manganese bronze stop collar on stem above actuator.

6. Drill and connect stem to slide structural sections with Type 316 stainless steel bolts.

7. Minimum Stem Diameter:
   a. Upper Gate: 2 1/4 inches
   b. Lower Gate: 2 1/2 inches

8. Coordinate the selection of the gate stem configuration with the gate operator and operating speed:

a. The selected gate stem configuration shall provide the most efficient combination of stem diameter/pitch/lead and keep the operating temperature at the stem nut to a minimum during operation.

9. Stem covers shall be clear, UV resistant polycarbonate material.

F. Operating nut:

1. Locate at operator level

2. Material: Manganese bronze

G. Gate operators: As specified in Section 40 05 57 - Actuators for Process Valves and Gates

H. Bolts, nuts, and fittings: Type 316 stainless steel

I. Anchor bolts:

1. Type 316 stainless steel

2.5 WALL MOUNT

A. Provide gate capable of mounting to existing, embedded wall thimbles, following their rehabilitation by the contractor.

B. Provide new stainless-steel studs for connection of gate frame to wall thimble. Reuse existing, concrete embedded anchors. Field verify location prior to submitting gate shop drawings.

C. Provide isolation kits between fabricated gate and mounting surface, and between stainless steel studs and fasteners and the mounting surface or frame.

D. Provide a waterproof mastic compound gasket or EPDM gasket to cover the entire face of the thimble and contact area with the stainless-steel gate frame.

2.6 FINISHES

A. Stainless Steel:

1. Shot blast gates after fabrication to remove weld splatter and polish scratches.

2. Clean the entire surface to produce an even color and sheen.

B. Operators, stands, and other accessory equipment: Surface preparation, factory prime, and factory finish coats as required by the manufacturer.

2.7 FABRICATION

A. Shop assembly:

1. Gates shall be factory assembled, adjusted, and tested.

2. Mount all accessories and appurtenances including, but not limited to, operators and limit switches so that the complete system may be tested at the factory.

2.8 SOURCE QUALITY CONTROL

A. Factory testing:

1. All gates shall be factory tested before shipment.

2. Test all equipment
a. Use of prototype components or factory actuators and motors will not be accepted.

3. Operational testing:
   a. Test functionality of all controls and limit switches.
4. Leakage test:
   a. Verify compliance with allowable leakage limits as specified in this Section.
   b. Conduct in accordance with AWWA C561.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that facilities are ready to receive slide gates.

B. Verify that slide gates are sufficiently prepared for installation.

3.2 PREPARATION

A. Clean adjacent surfaces according to manufacturer instructions and the requirements of the Contract Documents including concrete surfaces and the existing wall thimbles.

1. Thoroughly clean thimble mounting surface after existing gate removal. Inspect and evaluate existing thimble face for flatness and confirm it meets the requirements of the gate to be mounted and the proposed gasket materials.
2. Perform field machining or scraping as required to achieve this thimble face tolerance.

B. Contractor shall furnish services of a qualified manufacturer’s representative experienced in installation and operation of gates.

C. Contractor shall coordinate field service work with the manufacturer’s representative, Owner, and Engineer prior to initialing field service work.

3.3 INSTALLATION OF STAINLESS-STEEL SLIDE GATES

A. Install in strict conformance with the Drawings, manufacturer’s installation instructions, shop drawings, and recommendations.

B. Adjust wedges or other parts of the gate such that it is not possible to insert a 0.004-inch feeler gauge between the gate slide and the gate frame at any point.

1. Securely lock wedges into position after adjustment.

C. Ensure that products are installed plumb, true, and free of warp or twist.

D. Locate operators at locations indicated on the Drawings.

1. Adjust limit switches in accordance with manufacturer's instructions.

E. Lubricants: Provide oil and grease as required for initial operation. Provide one year’s supply of lubricants required for routine maintenance of gates.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. Verify alignment of gate and components.
2. Verify that gate operates smoothly and does not bind or scrape.

B. Leakage Testing:

1. Testing shall comply with AWWA C561.

2. Verify compliance with allowable leakage limits as specified.

C. Manufacturer Services:

1. Manufacturer’s representative shall perform the services described below and specified in Section 01 70 00 - Execution and Closeout Requirements:
   a. Field testing
   b. Installation assistance and inspection:
      1) Advise/observe Contractor on the installation of the gates.
      2) Check and verify that installation of the gates is in accordance with the Drawings and manufacturer's installation instructions.

2. Provide certificates:
   a. Manufacturer’s Certificate of Installation and Functionality Compliance

3. Manufacturer's Representative onsite requirements:
   a. Installation: 1 trip, 1 day minimum
   b. Functional Testing: 2 trips, 1 day minimum each

4. Training:
   a. Provide training for operation and maintenance of equipment to owner’s personnel during functional testing trip.
   b. Review operation and maintenance documentation and perform general maintenance tasks associated with the equipment installed.
   c. Provide owner with documentation and training materials and allow for video recording of training.

D. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.5 TESTING AND ADJUSTING

A. After installation, the gate shall be cleaned, lubricated, and otherwise serviced by the Contractor in accordance with manufacturer's instructions. The Contractor shall test the operation of the gate at least two times through its full range of movement. Verify smooth travel of the gate through the entire range of motion, and the function of actuators, limit settings, motor current draw, and other operating parameters to confirm conformance with the contract documents.

B. Gate stems, stem guides, and gate lifting equipment shall be carefully aligned so that the stem shall be parallel to the guide bars or angles on the gate frame after installation.

C. Changes and adjustments shall be made by the Contractor to provide satisfactory operation of the complete gates system.

D. Meet the requirements of Section 01 70 00 - Execution and Closeout Requirements.

END OF SECTION