TOMBALL ISD
DESTINATION EXCELLENCE

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

PROJECT MANUAL

FOR

District-Wide Security Fencing Improvements

ISSUED FOR BIDDING
May 28, 2024

MWA ARCHITECTS

MWA Architects, Inc.
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TBAE Firm Registration No. BR 616

CONTRACT DOCUMENTS FOR

TOMBALL ISD
310 S. Cherry Street
Tomball, Texas 77375

CONTRACT DOCUMENTS:

District-Wide Security Fencing Improvements
MWA Project #24-10

ISSUE DATE: May 28, 2024, Issued for Permitting and Bidding

OWNER
Tomball Independent School District
Facilities Department
310 S. Cherry Street
Tomball, Texas 77375

PROGRAM MANAGER
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PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Project information
2. Work covered by Contract Documents
3. Phased construction
4. Access to site
5. Coordination with occupants
6. Work restrictions

1.3 SCOPE OF WORK

A. The work consists of providing security fences and gates at the following District schools:

1. Canyon Pointe Elementary School (13002 Northpointe Blvd, Tomball, TX 77377).
2. Early Excellence Academy (1440 Keefer Rd, Tomball, TX 77375).
3. Rosehill Elementary School (17950 Tomball Waller Rd, Tomball, TX 77377).
4. Tomball Elementary School (1110 Inwood St, Tomball, TX 77375).
5. Willow Creek Elementary School (18302 N Eldridge Pkwy, Tomball, TX 77377):
6. Tomball Intermediate School (723 W Main St, Tomball, TX 77375).
7. Grand Lakes Junior High (20247 Cypress Rose Hill Rd, Tomball, TX 77377).
8. Willow Wood Junior High (11770 Gregson Rd, Tomball, TX 77377).
9. Tomball High School (30330 Quinn Rd, Tomball, TX 77375):
10. Tomball Star Academy (11211 Farm to Market 2920 Building 3, Tomball, TX 77375).
11. Tomball Memorial HS (19100 Northpointe Ridge Ln, Tomball, TX 77377).

1.4 SCHEDULE OF VALUES FOR BID PACKAGES. If multiple project sites are identified in the Work, the contractor shall provide one Schedule of Values for each project site attached to each application for payment. In addition, each school site shall have a separate schedule of values in current CSI format for Renovation Work and for Addition Work, identifying the labor and material components separately.

1.5 CONCURRENT CONSTRUCTION FOR BID PACKAGES. Work (additions and renovations) at each school site will be performed concurrently with the other school sites unless otherwise indicated by TOMBALL ISD.

PHASING. Since the school buildings will be in use during construction, the Work shall be conducted in such a manner as to not interrupt or disturb school activities. Phasing plans are guidelines and are used to identify a possible approach to the work. *The contractor may* submit a phasing plan for all scopes of work taking place when requested. Any deviation from the suggested plan contained in the contract documents must be approved by the A/E, owner or owner's representative, and Principal prior to implementation*.*

Project Management Control System (PMCS) - ProjectMates

1.1 The District and Owners Representative have agreed to use Projectmates as the tool to manage projects between District, Owners Representative, and vendors (general contractors and architects).

1.2 The following modules will be implemented:

- Budget
- Contracts
- Invoices
- Payments
- Change Orders
- Close Out
- Issues
- Meeting Minutes
- Requests for Information
- Submittals
- Transmittals
- Field Details
- Field Work Directives
- Punch List
- Safety Notices

1.3 HAZARDOUS MATERIAL DESIGN AND CONSTRUCTION. TOMBALL ISD has retained a separate environmental consultant to prepare contract documents including design drawings and specifications for the removal of hazardous materials from the schools.

It shall be the responsibility of the Contractor to coordinate with the scheduled work performed by any of TOMBALL ISD's separate Contractors including the hazardous materials abatement contractor. Contractor shall coordinate all aspects of the hazardous material abatement contractor's work with the Work under this Agreement. The Contractor shall always keep the Program Manager informed of all coordination issues with TOMBALL ISD separate contractors. Other Contractor responsibilities in relation to the hazardous material design and construction coordination are per Article 6 of the General Contractor's Contract.

1.4 Permitting: Contractors are responsible for the costs of acquiring the building permits. The Contractor will obtain and pay for all trade permits and other

miscellaneous permits that may be required by the City. Tap fees for connections to off-site water and sewer lines will be paid by the unless specified differently by contract documents.

1.5 Storm Water Pollution Prevention Plan: Once the Notice to Proceed has been issued, the Contractor is obligated to comply with the applicable municipalities and applicable SWPPP codes and protocol. The Contractor assumes full responsibility for any complaints, citations, maintenance and complete management of the SWPPP plan including any and all documentation. For new schools with demolition scope by a separate contractor, Contractor shall coordinate with the separate contractor for a seamless transfer / transition of an existing SWPPP. Contractor will then submit all documentation to the District at closeout.

1.6 Construction Specification Index: All construction documentation will follow the 2004 Construction Specification Index format.

1.7 The contractor shall tag locations of all equipment within the scope of work to comply with TOMBALL ISD construction standards issued May 01, 2019.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

3.1 USE OF PREMISES

A. Contractor shall coordinate work of all trades with assistance by owner's representative for all subcontractors or consultants retained by TOMBALL ISD. Contractor shall sequence, coordinate, and perform the Work to impose minimum hardship on the operation and use of the existing facilities and/or Project site. Contractor shall install all necessary protection for existing improvements, Project site, property, and new Work against dust, dirt, weather, damage, vandalism, and maintain and relocate all protection to accommodate progression of the Work.
B. Contractor shall confine entrance and exiting to the Project site and/or facilities to routes approved by the Owner.
C. Within existing facilities, the Owner will remove or request the contractor to remove portable equipment, furniture, and supplies from work areas prior to the start of Work. CONTRACTOR shall cover and protect remaining items in areas of the Work.

D. Contractor shall furnish, install, and maintain adequate supports, shoring, and bracing to preserve structural integrity and prevent collapse of existing improvements and/or Work modified and/or altered as part of the Work.
E. Contractor shall secure building entrances, exits, and Work areas with locking devices as required by the Owner.
F. Contractor assumes custody and control of Owner property, both; fixed and portable, remaining in existing facilities vacated during the work.
G. Contractor shall cover and protect surfaces of rooms and spaces in existing facilities turned over for the work, including Owner property remaining within as required to prevent soiling or damage from dust, dirt, water, and/or fumes. Contractor shall protect areas adjacent to the Work in a similar manner. Prior to Owner occupancy, Contractor shall clean all surfaces including OWNER property.
H. Contractor shall not use or allow anyone other than Owner employees to use facility telephones and/or other equipment, except in an emergency. Contractor shall reimburse Owner for telephone toll charges originating from the facility except those arising from emergencies or use by Owner employees.
I. Contractor shall protect all surfaces, coverings, materials, and finished Work from damage. Mobile equipment shall be provided with pneumatic tires.

End of Section 01 10 00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Provisions established within the General, Supplementary and Other Conditions of the Contract, Division 01 – General Requirements, and the Drawings are collectively applicable to this Section.

1.2 REQUIREMENTS INCLUDED

A. Procedures for preparation and submittal of Schedule of Values.

1.3 RELATED SECTIONS/DOCUMENTS

A. General Conditions.
B. Section 01 29 00 – Payment Procedures.

1.4 FORMAT

A. Print schedule on AIA Documents G703 – Continuation Sheet for Application and Certificate for Payment.
B. Follow Table of Contents of Project Manual for listing components parts. Identify each line item by number and title of major Specifications Section.

1.5 CONTENT

A. Using the current Master Format™ Edition, in CSI format, each school shall have a separate schedule of values for Renovation Work and for Addition Work, as applicable.
B. In CSI format, list installed value of each major item of Work and each subcontracted item of Work as a separate line item to serve as a basis for computing values for Progress Payments. Round off values to nearest dollar. All values should be taken to the Dollar.
C. In CSI format, for each major subcontract, list products and operation of that subcontract as separate line items.
D. List Owner Controlled Contingency Allowance and other allowances with the specified monetary amount for each allowance in separate divisions.
E. Contractor to use separate lines for bonds, insurance, temporary facilities and controls, superintendents, mobilization, and demobilization. Each item shall include pro rata portion of overhead and profit.
F. Provide line item for safety on the SOV.
G. Provide line item for closeout on the SOV.
H. The sum of the values listed shall equal total Contract Sum.

1.6 SUBMITTAL

A. GC prepares and submits a Schedule of Values timely prior to the submittal of the first pay application and that the A/E and PMT reviews and responds prior to the approval of the first pay application.
B. Upon resolution of issues, the PM is responsible for providing a letter accepting the Schedule of Values.
C. Payment against the approved schedule of values is based on earned value which is derived from the status of the construction as observed by the A/E and PM.
D. Submit a copy via Projectmates transmittal of the Schedule of Values within ten (10) days of award of contract and prior to Pre-Construction Meeting or first pay application.

E. Identify Project by title and number.
F. Secure the A/E and owner's representative (PM) approval of the Schedule of Values prior to submitting the first Pay Application.

G. The activities on the Schedule of Values are to reflect construction by area or phase.
H. Breakdown all costs into equipment, materials, and labor.

PART 2 PRODUCTS (Not Applicable)

PART 3 PART 3 – EXECUTION (Not Applicable)

End of Section – 01 29 73

PART 1 GENERAL

1.1 Description

A. Section includes administrative and procedural requirements for developing, submitting and updating a Critical Path Method (CPM) schedule.

1.2 Quality Control and Quality Assurance

A. The Contractor shall develop and maintain a Project Schedule in accordance with the requirements of this Section. The requirement for a Project Schedule is included to:
   1. Ensure adequate planning before and during the execution and progress of the Work in accordance with the allowable number of working days and milestones.
   2. Assure coordination and execution of the work among various trades of the Contractor, subcontractors, suppliers, third party utility companies or other related entities that may be involved in the Project.
   3. Assist the Contractor, architect and the Owner in evaluating:
      a. Contract performance relative to the required contract schedule milestones.
      b. Monthly progress.
      c. Proposed Contract Modifications.
      d. Documenting anticipated, requested and or approved time extensions.
      e. The documentation of unplanned events, time extensions and other impacts arising from such events.

B. The project schedule shall show the sequence and interdependencies of activities required for complete performance of the work. The Contractor shall be responsible for assuring all work sequences are logical and show a coordinated plan of the work. The project schedule shall employ computerized CPM planning, scheduling and progress reporting of the work as described in this specification. The Contractor shall create and maintain the schedule using project scheduling software that utilizes the fundamentals of CPM for scheduling. New schools or projects with a value of $5M dollars or more will be required to use P6 scheduling. A variance can be given by owner's representative if requested in writing prior to the NTP.

C. New schools or projects of $5M or more: Within seven (7) calendar days after issuance of Notice to Proceed unless otherwise noted the Contractor shall designate in writing a schedule representative who shall be responsible for coordinating with the PM during development and maintenance of the Project Schedule. The Contractor's representative shall have the expertise to operate the CPM software and be capable of rapidly evaluating alternate scenarios to optimize management capabilities. The Contractor has the option to utilize qualified outside scheduling consultation for the assistance of developing and maintaining the Project Schedule, however, the use of an outside consultant does not relieve the Contractor of responsibilities for compliance of this specification. The Contractor's schedule representative shall have complete authority to act for the Contractor in fulfilling the schedule requirements of the Contract.

D. All activities shall have at least one predecessor and one successor unless approved by the PM. The exceptions are no predecessor is needed for the Notice To Proceed (NTP) milestone and no successor is needed for the Project Completion milestone.
E. With the exception of the specified contract substantial completion milestone, the contractor shall not use any constraints of any type without prior approval of the Owner.
F. The Baseline Schedule project substantial completion milestone for each campus shall be assigned a "Finish on or Before" constraint. The required contract finish date shall be assigned to track project delivery related to contract requirements. The progress schedule submitted shall not have any constraints without approval from district PM.
G. Each activity's "Activity ID" and "Activity Description" or "Task Name" shall remain unchanged throughout the duration of the project subsequent the acceptance by the Owner.
H. An activity's "Activity Description" may only be revised to clarify an activity's original scope. If the scope of an activity increases or decreases, a replacement activity shall be created.
I. PM acceptance shall be obtained prior to making any changes or revisions to an activity's "Activity Description".

1.3 Submittals

A. All CPM Schedules (preliminary and baseline) shall be presented submitted per specification 01 33 00 at review meeting on two (2) copies in 11 X 17. One electronic copy in pdf and an accessible format not pdf to be uploaded to Projectmates per submittal procedures 01 33 00. The substantial completion date in the detailed CPM schedule shall coincide with the substantial completion date on the contract.
B. Schedule Update: The Contractor shall submit with every payment application a copy of the approved baseline CPM Schedule with a narrative of the progress or delay of scheduled activities.
C. Recovery or Revision to the CPM Schedule: The Contractor shall provide a Recovery CPM Schedule within seven (7) calendar days of any CPM schedule update meeting or at the request of the architect or owner's representative. A recovery schedule to the baseline will be requested if any milestone, completion date or end of Period Performance falls seven (7) calendar days or greater behind scheduled completion of the activity on the CPM schedule. (negative float).
D. Schedule Review: All schedules that are to be submitted for review shall be stamped as being reviewed/approved by the General Contractor.

PART 2 PRELIMINARY CPM SCHEDULE

2.1 Preliminary CPM Schedule

A. The preliminary CPM schedule will be delivered to the owner's representative and architect within three (3) days of NTP. The preliminary CPM Schedule shall be the basis for the sequence of work during the first sixty (60) calendar days of the Contract while the Project Schedule is being developed, submitted, reviewed and accepted. If the acceptance of the Project baseline CPM Schedule

extends beyond sixty (60) days, the Preliminary CPM Schedule shall be updated according to the requirements stated in paragraph 3.03.

2.2 Schedule Review and Acceptance

~~A.~~ The PM, Architect/Engineer and the Contractor shall meet within seven (7) calendar days of receipt of any CPM Schedule for joint review. The Contractor shall revise any areas, which, in the opinion of the owner's representative and/or Architect/Engineer, conflict with either the intent of this specification or the timely completion and acceptable coordination of the Project. In the event the Contractor fails to define any element of work activity or logic currently designed and the owner's representative review does not detect this omission or error, such omission or error, when discovered by the Contractor, architect or the owner's representative, shall be corrected by the Contractor.

B. Within seven (7) calendar days after the joint review between the architect, contractor and the owner's representative, the Contractor shall revise the CPM Schedule in accordance with agreements reached during the joint review and submit the revised schedule as project CPM schedule per the deliverable requirements.

C. Acceptance of the CPM project schedule by the architect and owner's representative does not relieve the contractor of any of its responsibility for the accuracy or feasibility of the project schedule. However, to the extent that the accepted Project Schedule is reasonable, it becomes a part of this Contract.

D. Submission and final acceptance by architect and owner's representative of the CPM schedule will be a condition precedent to the application or payment of any progress payments under the contract, unless otherwise agreed upon by the Owner. The owner's representative shall notify the contractor of the Owner acceptance of the CPM Schedule in writing.

PART 3 PROJECT CPM SCHEDULE

3.1 Project Schedule

A. The Project Schedule shall begin at the project NTP and incorporate the accepted Preliminary CPM Schedule including all required revisions and applicable progress updating as warranted. The baseline project schedule shall indicate a logical sequence of work for each project site (school). Utilize the schedule in planning, scheduling, coordinating and performing the work under this Contract (including all activities of subcontractors, equipment vendors and suppliers). The Project Schedule shall indicate the sequence and interdependencies of activities required for complete performance of the Work.

Proposed durations assigned to each activity shall not exceed ten (10) days unless approved by owner's representative in writing. In developing the baseline project schedule, the Contractor shall be responsible for ensuring that subcontractor work scope and sequencing at all tiers, as well as its own work, is included. If a contract for a subcontractor has not yet been awarded for a certain portion of the work, the Contractor is responsible for the development of the schedule for the work as described under this section. After the subcontractor award of

contract, the Contractor shall modify the current accepted schedule to reflect any changes or revisions for the subcontractor sequence of work and submit for approval to architect and owner's representative. Under no circumstance or event, shall a schedule modification or revision under this paragraph extend a milestone. The baseline project schedule shall comply with the various limits imposed by the scope of work and by any contractually specified intermediate milestone dates and completion dates. The degree of detail shall be to the satisfaction of the architect and the owner's representative.

B. Provide sufficient detail and clarity of form and technique so that all work can be properly controlled and progress monitored by the owner's representative and architect. The project schedule shall consist of, but not be limited to, the following criteria:
    1. Full detail of all major procurement activities including the activities and information contained within the baseline CPM Schedule. Break up all procurement activities for major components and long lead items to include submittal dates, fabrication duration, and expected delivery dates.
    2. Full detail of all major construction activities including the activities and information contained within the CPM Schedule. Add column for responsible party (i.e. owner, subcontractor trade, 3rd party, etc.) for all construction activities.
    3. Multiple Calendars shall be used for establishing Holidays and periods of non-work based on the School Operations Parameter Statement in the Project Information Section of Division 0, concrete curing activities, other weather or ambient temperature sensitive construction activities, and or other work requiring overtime or double shift work.
    4. Seasonal weather conditions shall be considered and included in the planning and scheduling of all work influenced by high or low ambient temperatures, precipitation and/or saturated soil to ensure recognition, planning and anticipation of intermittent inclement weather throughout the project duration on a monthly basis. In addition, activities of similar nature shall be assigned to independent calendars based on this weather data. Contractor to provide a Weather Log each month as part of their Schedule Submittal.
    5. Activity duration in whole working days with a maximum duration of ten (10) working days each, unless otherwise approved by the owner's representative, except for non-construction activities including mobilization, procurement and concrete curing activities.
    6. For projects where hazardous materials are present and require abatement by the Owner, such abatement activities may take place prior to the Contractor's mobilization and start of any work or they may take place concurrently with the Contractor's work. In cases where abatement activities must take place concurrently with Contractor's work, the Contractor shall allow for these activities to be incorporated into the Project CPM Schedule as separate activity line items. The Contractor shall

allow time for these activities to take place at the appropriate time within the project schedule and shall coordinate their work with such abatement activities.

7. At a minimum, the following guidelines, intermediate and final milestones shall be included in the project schedules for each individual project site (school).
   a. Notice to Proceed
   b. Required Periodic Inspections (examples: rebar, utilities, electrical and mechanical rough-in, overhead and architectural
   c. Time allotted for coordination with and execution of abatement activities
   d. Specific Phase start and finish dates – renovations and additions
   e. CPM Schedule submission and acceptance
   f. Building dry-in
   g. Permanent power
   h. Conditioned air available
   i. Completed testing and acceptance of Life Safety Systems and other critical building components
   j. Completion of ADA upgrades in restrooms
   k. Commissioning, when project requires
   l. Building Flush out, when project requires
   m. Ten percent (10%) minimum float for the project
   n. Substantial Completion
   o. Final Completion
   p. Owner Turn-Over / Start-Up / Project Closeout Activity / Warranty Period / Owner Testing/Training
   q. Earliest Date that Owner can occupy the affected portion of the building (by phase, by complete project, etc.). This shall include all necessary approvals, permits (Fire Marshall Acceptance, Certificate of Occupancy, etc.).

C. The Contractor shall prepare a written narrative explaining the Contractor's approach to construction for the entire project. The narrative shall elaborate on the basis for durations, major equipment to be used, calendars utilized, activity coding applied, smart ID descriptions and all major assumptions used to develop and support the schedule. The narrative shall also include the Contractor's description of the critical path work activity as represented in the baselined project schedule.

D. Deliverable: Within fourteen (14) calendar days after the Notice to Proceed, the project CPM schedule deliverable will be submitted by the Contractor and uploaded to Projectmates shall include the following:
   1. Two (2) copies (preferably 11 x 17) of the project schedule delivered at the review meeting. The critical path shall be readily discernible in red ink.
   2. Two (2) copies of the written narrative as described in paragraph 3.1.C.
   3. One (1) electronic copy in pdf and an accessible format not pdf to be uploaded to Projectmates per 01 33 00.

3.2 Schedule Review and Acceptance

A. The architect, owner's representative, and the Contractor shall meet within seven (7) calendar days of submitted CPM project schedule on a date selected by the owner's representative and agreed upon by all. The meeting will be to discuss review the submitted project schedule. If a revision or justification is requested, the Contractor shall re-submit the proposed project schedule within seven (7) calendar days and address all issues to the satisfaction of the architect or owner's representative. Any and all disagreements or interpretations of the meaning or intent of this specification shall be solely dictated by the Owner.
B. The architect, owner's representative and the Contractor shall meet within seven (7) calendar days of receipt of the Contractor's response, if needed, to review, corrections or adjustments of the Contractor's proposed project schedule. Any area, in the opinion of the architect and/or owner's representative, conflicts with timely completion of the project, shall be subject to revision by the Contractor.
C. Within seven (7) calendar days after the joint review meeting and no acceptance of the project schedule, the Contractor shall incorporate revisions as directed by the architect and owner's representative and re-submit the proposed project schedule per the deliverable requirement as stated in paragraph 3.1.D. All further review by the architect and owner's representative and shall be within seven (7) calendar days of receipt of revised schedule by the contractor. This will continue until the architect and owner's representative are satisfied.
D. The owner's representative shall notify the Contractor in writing of final acceptance of the Contractor's Project Schedule using submittal approval procedures stated in section 01 33 00 and the project schedule will become baseline for the project. The baseline schedule will not be changed through the life of the project unless requested by owner or owner's representative in writing.
E. In the event the Contractor fails to define any element of work, activity or logic in the project schedule during the review and the owner or owner's representative does not detect this omission or error, when discovered it shall be corrected by the Contractor and amended to the project schedule as soon as possible. The process of approving Contractor's schedules and updates to Contractor's schedule shall not constitute a warranty by the Owner that any non-Contractor milestones or activities will occur as set out on Contractor's schedule.

3.3 Schedule Updates

A. After the Project Schedule is accepted by the architect and owner's representative and the Contractor, it shall be "baselined" and used as a comparison for future progress updates.
B. If the Contractor's schedule reflects or the architect and/or owner's representative determines, that the Contractor is at least ten percent (10%) or at least negative seven (-7) calendar days behind the "baselined" schedule, the Contractor shall provide a revised or recovery schedule. The Contractor's revised or recovery schedule must incorporate a proposed plan for bringing the work back on schedule and completing the work by the contract completion date at no additional expense to the Owner. A narrative indicating the revised approach to schedule recovery is to accompany the recovery schedule submittal. The

revised or recovery schedule shall be in accordance to paragraph 1.3.B.

C. Out-of-Sequence progress logic shall be reviewed by the contractor's scheduler and corrected before submitting the progress update.

D. The percentage of all work shall be calculated by estimating the actual remaining duration time for each progressed activity. The data date of each schedule update shall be determined by the owner's representative. Contractor prepared estimates of the percent completion of each scheduled activity and the necessary supporting data shall be submitted.
   1. One (1) original baseline schedule indicating actual activity start and/or finish dates and revised (current) remaining durations.
   2. A narrative report shall be included that indicates in writing those activities the Contractor knows to be seven (7) days beyond the baseline schedule completion date and current or anticipated conditions that have delayed or may delay the work in order to discuss remedial action. The Contractor shall also explain, for work that reflects less than satisfactory progress, whether any uncompleted and/or upcoming work will (or will not) be affected in a like manner and the Contractors method of correction. Any additional written information necessary to support the updated schedule including explanations of revisions to activities: logic, durations, resources, etc.

E. In case of disagreements at the project progress meeting concerning actual progress to date, the Owner or owner's representative determination shall govern. Upon completion of the schedule update meeting, the Contractor shall revise the schedule update to reflect progress as of the date of the schedule update meeting and any approved revisions to the schedule update and carry out a computer produced calculation to determine the status of the project schedule.

F. Each Schedule Update shall be forwarded to the architect and owner's representative using the owner's project management software per section 1.3.A of this specification within seven (7) calendar days after the schedule update meeting and shall include a narrative report with the following information:
   1. Activities that have been added to the project schedule update.
   2. Activities that have been deleted from project schedule update.
   3. Activities that have "Actual Starts" prior to the month of this project schedule update and remain unfinished.
   4. Activities that have "Actual Starts and Actual Finishes" in the month of this project schedule update.
   5. A description of any approved revisions to the activity descriptions, schedule logic, or initial activity durations.
   6. One (1) electronic copy of the updated CPM schedule update indicating the progress made up to the date of the schedule update and indication of any revisions to the CPM schedule update uploaded to Projectmates per 1.3.A of this specifications.

7. One (1) electronic pdf format written narrative as described in paragraph 3.3.F and uploaded to Projectmates with the updated schedule.
8. One (1) native "xer" electronic file with the native updated schedule for the owners review. Transmittal by Email to the PM with a transmittal cover sheet uploaded to Projectmates with the schedule pay application files.
9. A list of all days occurring for the life of the project that may have impacted the schedule. Determination on the validity of the impact will be established at the recovery schedule meeting. If all parties cannot agree the owner's representative's determination shall govern.

3.4 Revisions to the Project Schedule

A. The Contractor may also request revisions to the project schedule in the event the contractor's planning for the work is revised. If the Contractor desires to make changes in the project schedule to reflect revisions in his method of operating and scheduling of the work, the contractor shall notify the architect and owner's representative in writing, stating the reason for the proposed revision. If revision to the schedule is contemplated, the architect or owner's representative shall so advise the other in writing at least seven (7) calendar days. A schedule update meeting will be requested by the contractor describing the revision and setting forth the reasons thereof.

3.5 Project Float Time

A. Float time is not for the exclusive use or benefit of either the contractor or the Owner. Contractor's work shall proceed according to early start dates, and the Owner shall have the right to reserve and apportion float time according to the needs of the project. The contractor acknowledges and agrees that actual delays, affecting paths of activities containing float time, will not have any affect upon contract completion times, providing that the actual delay does not exceed the float time associated with those activities.

3.6 Impact Analysis for: Change Orders, Delays, and Contractor Requests

A. Recommendation to the Owner for the acceptance or rejection of each time impact will be made by the architect and/or the owner's representative. Recommendations shall be made within seven (7) calendar days after a schedule review meeting has taken place, unless subsequent meetings or negotiations are necessary. After a decision has been made by the Owner an acceptance notification will be sent by the owner via change order with approved time if accepted. All approved changes shall be incorporated into the baselined schedule prior to the next pay application by the contractor.

End of Section 01 32 16

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections but not limited to:
   1. Division 01 Section "Payment Procedures" for submitting Applications for Payment.
   2. Division 01 Section "Schedule of Values" for submitting the schedule of values.
   3. Division 01 Section "Project Management and Coordination" key personnel.
   4. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
   5. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
   6. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   7. Division 01 Section "Demonstration and Training" for submitting video recordings of equipment demonstration and training of Owner's personnel.

C. Refer to other Division 1 Sections and other Contract Documents for Specifications on administrative submittals. Such submittals include, but are not limited to the following:
   1. Permits.
   2. Payment Applications.
   3. Inspection and Test Reports.
   4. Schedule of Values
   5. Progress Reports.
   6. Listing of Subcontractors

D. Shop Drawings are technical drawings and data that have been specially prepared for this Project, including but not limited to the following items:
   1. Fabrication and installation drawings.
   2. Setting diagrams.
   3. Shop-work manufacturing instructions.
   4. Templates.
   5. Patterns.
   6. Coordination drawings (for use on-site).
   7. Schedules.
   8. Design mix formulas.
   9. Contractor's engineering calculations.

      Standard information prepared with specific reference to a Project is not considered to be shop drawings.

E. Product Data includes standard printed information on manufactured products that has not been specially prepared for this Project, including but not limited to the following items:
   1. Manufacturer's product specifications and installation instructions.
   2. Standard color charts.
   3. Catalog cuts.
   4. Rough-in diagram and templates.
   5. Standard wiring diagrams.
   6. Printed performance curves.
   7. Operational range diagrams.
   8. Mill reports.
   9. Standard product operating and maintenance manuals.
      Modify standard product data, drawings and diagrams to delete information not applicable to the project, and / or supplement standard information to provide specific data that is applicable to the work.

F. Samples are physical examples of Work, including but not limited to the following items:
   1. Partial sections of manufactured or fabricated work.
   2. Small cuts or container of materials.
   3. Complete units of repetitively used materials.
   4. Swatches showing color, texture and pattern.
   5. Color range sets.
   6. Units of work to be used for independent inspection and testing.

G. Miscellaneous Submittals are work-related, non-administrative submittals that do not fit in the three previous categories, including but not limited to the following:
   1. Specially prepared and standard printed warranties.
   2. Maintenance agreements.
   3. Workmanship bonds.
   4. Survey data and reports.
   5. Project photographs.
   6. Testing and certification reports.
   7. Record Drawings.
   8. Field measurement data.
   9. Operating and maintenance manuals.
   10. Keys and other security protection devices.
   11. Maintenance tools and spare parts.
   12. Overrun stock.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's and/or Contractor's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.

B. Informational Submittals: Written and graphic information and physical samples that may or may not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a

portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections. Submittal schedule will be delivered by contractor within 7 days of NTP.

1. Coordinate submittal schedule with list of subcontracts and Contractor's construction schedule.
2. Submit revised submittal schedule monthly to reflect changes in current status and timing for submittals.
3. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: i.e. Action, informational, shop drawing.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Architect's final release or approval.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Contractor must process Submittals using the Owners designated software (Projectmates).

B. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings. Architect will use transmittal in owner’s designated software to record distribution of CAD drawings or other electronic files.
   a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
   b. Digital Drawing Software Program: The Contract Drawings may be in AUTOCAD format.

C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
    1. Initial Review: Allow 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
    2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
    3. Resubmittal Review: Allow 14 calendars days for review of each resubmittal.
    4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 14 calendar days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

E. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
    1. Indicate name of firm or entity that prepared each submittal on label or title block.
    2. Include the following information for processing and recording action taken:
        a. Project name
        b. Date
        c. Name of Architect
        d. Name of Contractor
        e. Name of subcontractor
        f. Name of supplier
        g. Name of manufacturer
        h. Submittal number or other unique identifier, including revision identifier.
            1) Submittal number to include submittal sequence number and specification section number 001-06 10 00. Resubmittals to add R1 (e.g. 001-06 10 00(R1).
        i. Number and title of appropriate Specification Section.
        j. Drawing number and detail references, as appropriate.
        k. Location(s) where product is to be installed, as appropriate.
        l. Other necessary identification.

F. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
    1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.

2. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
3. Include the following information on an inserted cover sheet as applicable:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Contractor.
   e. Name of subcontractor.
   f. Name of supplier.
   g. Name of manufacturer.
   h. Number and title of appropriate Specification Section.
   i. Drawing number and detail references, as appropriate.
   j. Location(s) where product is to be installed, as appropriate.
   k. Related physical samples submitted directly.
   l. Other necessary identification.
4. Include the following information as keywords in the electronic file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.

G. Options: Identify options requiring selection by the Architect.
H. Deviations: Identify deviations from the Contract Documents on submittals.
I. Transmittal: Assemble each submittal individually and upload to owner's designated software. Use submittal procedures to direct submittals to the party or parties responsible for review and approval of submittal. Reviewers will return submittals using the owner's designated software submittal reviewer procedure.
J. Resubmittals: Make resubmittals in same form as initial submittal and use owner's designated software submittal procedure.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities.
L. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

PART 2 PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
   1. Post electronic submittals as PDF electronic files directly to the appropriate location within the Owners designated software

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals via the Owners designated software as PDF electronic files.
   a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
3. Action Submittals: Submit informational submittal with request for Architect to review action submittal and provide date and time for event.
   a. Create individual action submittal using owner's designated software. Provide cover page per section F.4. Provide pictures, copies of emails or other proof Architect and contractor have reviewed action submittal.
4. Informational Submittals: submit as PDF electronic files directly to the appropriate location within the Owners designated software.
5. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
6. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
7. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
   2. Mark each copy of each submittal to show which products and options are applicable.
   3. Include the following information, as applicable:
      a. Manufacturer's catalog cuts.
      b. Manufacturer's product specifications.
      c. Standard color charts.
      d. Statement of compliance with specified referenced standards.
      e. Testing by recognized testing agency.
      f. Application of testing agency labels and seals.
      g. Notation of coordination requirements.
      h. Availability and delivery time information.
   4. For equipment, include the following in addition to the above, as applicable:
      a. Wiring diagrams showing factory-installed wiring.
      b. Printed performance curves.
      c. Operational range diagrams.
      d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
   5. Submit Product Data before or concurrent with Samples.
   6. Submit Product Data in the following format:

a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data**,** unless submittal based upon Architect's digital data drawing files is otherwise permitted.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.
   2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
   3. Submit Shop Drawings in the following format:
      h. PDF electronic file.
      i. Primitive native file if requested by architect or owner.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Identification: Attach label on unexposed side of Samples that includes the following:
      a. Generic description of Sample.
      b. Product name and name of manufacturer.
      c. Sample source.
      d. Number and title of applicable Specification Section.
   3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
      a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
   4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
      a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
   5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range

of color and texture variations expected. Architect to approve sample size.

a. Number of Samples: Submit three sets of Samples. Architect will retain one with option to provide owner a sample; Sample sets; remainder will be returned.
    1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
    1. Name, address, and telephone number of entity performing subcontract or supplying products.
    2. Number and title of related Specification Section(s) covered by subcontract.
    3. Drawing number and detail references, as appropriate, covered by subcontract.
    4. Submit subcontract list in the following format:
        a. PDF electronic file.
        b. Number of Copies: Three paper copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

F. Qualification Data: Prepare written in pdf format information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, and other information specified.

G. Welding Certificates: Prepare written in pdf format certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

H. Installer Certificates: Submit written in pdf format statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

I. Manufacturer Certificates: Submit written in pdf format statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

J. Product Certificates: Submit written in pdf format statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

K. Material Certificates: Submit written in pdf format statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

L. Material Test Reports: Submit reports in pdf format written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

M. Product Test Reports: Submit written reports in pdf format indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

N. Research Reports: Submit written in pdf format evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   1. Name of evaluation organization.
   2. Date of evaluation.
   3. Time period when report is in effect.
   4. Product and manufacturers' names.
   5. Description of product.
   6. Test procedures and results.
   7. Limitations of use.

O. Preconstruction Test Reports: Submit reports written in pdf format by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

P. Compatibility Test Reports: Submit reports written in pdf format by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

Q. Field Test Reports: Submit reports in pdf format indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents. Submit reports in owner’s designated software

R. As pdf file upload in owner’s designated software with daily report for the work by contractor.

S. Design Data: Prepare and submit written in pdf format and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect using owner’s designated software in RFI module.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit in pdf format a copy of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
    1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT/ENGINEER’S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
    1. Action Stamp: The Architect/Engineer will stamp each submittal to be returned with a uniform, self-explanatory stamp, appropriately marked and executed to indicate the status of the submittal.
C. Informational Submittals: Architect will review each submittal. Architect will upload each submittal to owner’s designated software in the RFI module following the reviewer procedure.
D. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review. Architect will notify contractor through owner’s designated software via the RFI module or via email the submittal is incomplete.
E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
F. Submittals that are required per contract agreements may be reviewed and approved by owner or owner’s representative.

End of Section 01 31 00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, TISD Safety Program Guidelines Manual, apply to this Section.

1.2 CONSTRUCTION SAFETY AND LOSS CONTROL PROGRAM

A. Contractor, along with the Subcontractors of all tiers, shall develop a composite Safety Program. The safety plan establishes minimum standards of performance regarding safety during the course of the work on the project. The prevention of job-related injuries and illnesses may require additional safety devices and/or procedures beyond these minimum standards. This Safety Program will include enforcement of safe practices, instructions, and direction in the use of safety equipment and personal protective equipment, and other such activities as may be necessary and appropriate to maintain job safety and accident prevention. A copy of the site-specific plan shall be submitted to the TISD Project Manager for review prior to starting work onsite following submittal procedures outlined in 01 33 00.

B. Implementation and enforcement of the Safety and Loss Prevention Program for the work force of Contractor and all Subcontractors shall be responsibility of Contractor. Owner or representatives of the owner may conduct periodic jobsite safety inspections to monitor compliance with the Safety and Loss Prevention Program. If Contractor activities are not in compliance with their Safety and Loss Prevention Program, Owner or owner's representative will inform the Contractor in writing of the observed noncompliance, or safety hazards using owner's designated software (Projectmates). These items must be corrected in a timely manner. If the Contractor fails to correct any safety non-compliance or hazard, the Owner shall have the right but not the obligation to perform the correction action and withhold costs associated with the corrective action from the Contractors next or final payment. The owner or owner's representative reserve the right to shut down the job until corrections have been initiated and documented.

C. It is not the intent of this Contract to require the Owner, to provide services, assume responsibility or accept liability for the safety of work sites or any aspect of the work by Contractors or Subcontractors. Each contractor shall bear sole and exclusive responsibility for safety in all phases of their work. Nothing contained herein shall relieve such responsibility.

D. The Owner's role in achieving construction safety and health objectives include overall supervisory management for site safety. This responsibility does not supersede, override or take precedence over that of construction Contractors, who are ultimately responsible for the safety and health of their employees, Subcontractors, visitors, students, staff, the public and protection of property. The primary functions of the Owner as it relates to construction safety and health are to monitor Contractor compliance with the safety and health standards required by law and to administer and enforce the conditions of the contract pertaining to safety, health, and security.

E. Each Contractor and Subcontractor shall comply with all applicable safety related laws, including the following:
    1. Walsh-Healy Public Contracts Act 9 (Title 41 CFR, Part 50-2-3) and the included rules and regulations contained in the Occupational Safety and Health Standards, and Established Federal Standards (Title 20 CFR, Part 1910 and CFR, Part 1926).
    2. U.S. Department of Transportation Safety Requirements – Federal Highway Projects, 1968, including the requirements referred to in Appendix A therein.
    3. State and local codes and regulations.

F. Safety Documentation Reporting: Contractor shall submit to Owner and owner's representative the following reports upon request:
    1. All accident investigation reports shall be submitted no more than 24 hours after occurrence. The Contractor must maintain accurate records of personal injury and property loss, cooperate and aid in investigation of cases, and implement appropriate actions to prevent recurrence. Owner's representative shall be notified immediately following all accidents.
    2. A binder shall be maintained on site documenting safety orientation of new hire employees and shall be submitted when requested.
    3. Weekly Contractor-held safety meeting reports shall be logged in a binder on site and submitted upon request.
    4. Weekly site safety inspection reports performed by Contractor shall be logged in a binder on site weekly.
    5. Safe Plans of Action (SPA) shall be completed by the contractor prior to each task if required by loss and safety prevention plans and submitted upon request.
    6. Task Safety Awareness (TSA) meeting documents shall be maintained by the contractor if required by loss and safety prevention plans for review by the TISD Project Manager upon request.
    7. A summary log of all accidents and injuries including first-aid treatments is to be maintained on site and submitted upon request.
    8. Crane re-certifications on an occurrence basis and proof of certification prior to beginning work shall be maintained in a log on site and submitted upon request.
    9. A Job Safety Analysis (JSA) shall be performed, signed off by all crewmembers, job superintendent; and Contractors competent person prior to all lifting activities using any means.
    10. Crane Safety – all crane operations will require a JSA for all hoisting operations; copy of the crane lift chart marked with longest and heaviest lifts; all crew members to sign off on JSA; barricade tape around crane at all times; need crane crew to indicate on a copy of the crane's lift chart where the highest and heaviest pick is located; tail swing location, etc.
    11. A summary of contractor's OSHA Safety Violations and Citations for the site will be submitted to owner or owner's representative 4 working days prior to the opening Inspection Conference.

12. A notice of work termination shall be submitted via transmittal in owner's software (Projectmates) to owner or owner's representative by the Contractor within 10 calendar days of a Subcontractor completing work under its Contract and leaving the jobsite.
13. A site-specific safety plan must be submitted via submittal procedure 01 33 00 within thirty (30) days of NTP. The final site-specific safety plan must be accepted by Owner prior to approval of first pay application.
14. Name and qualifications of an on-site safety person will be documented within the site-specific safety plan prior to approval of plan.
15. List of Hazardous Substances brought on site and SDS for each item.
16. Copy of OSHA 300 log for their project.
17. Accident and injury reports within 24 hours of occurrence.

1.3 SITE SAFETY DEVICES

A. Contractor and its Subcontractors performing work at project site maintain responsibility for providing all safety related equipment such as, but not limited to, testing equipment, safety valving, chains, locks, alarms, signal, signage, and personal protective equipment necessary to protect site workers, students, staff, and the general public.
B. Employees on walking and/or working surfaces with unprotected sides or edges six feet (6') or higher above a lower level shall be protected from falling by the use of guardrails, nets or personal fall arrest systems. This shall include, but is not limited to employees on the face of formwork, reinforcing steel or structural steel during and after erection, exterior and interior masonry work, roofing work, window installation, electrical work, mechanical work, and all other trades that require crafts/workers to work in areas where the height exceeds six feet (6') above the ground or work surface.
C. One hundred percent (100%) personal eye wear and head wear protection is required in all construction work areas and shall be worn at all times by employees of both the contractor and subcontractors (regardless of subcontractor tier). Protective eye wear shall conform and meet requirements stated in ANSI 287.1-1968.
D. Clean-Up and Waste Disposal. Contractor shall perform a daily site cleanup and otherwise keep the Project Site free from accumulation of waste materials, rubbish and other debris resulting from the performance of the Work. The Contractor shall also be responsible for providing mowing / grass cutting services for areas inside of the construction areas weekly. Contractor shall, in compliance with Applicable Laws, remove, transport, and dispose of any Hazardous Substance transported onto the Project Site by or on behalf of Contractor or any Subcontractor's activities at the Project Site. Contractor shall notify the Project Company immediately upon the discovery of the presence of any Hazardous Substance on, or the release of any set forth above, Contractor shall not be responsible for the transportation, handling, storage or removal of any Hazardous Substances which existed at, on or in the Project Site prior to commencement by Contractor of the Work.

1.4 RESPONSIBILITY

A. Each participant involved in the construction of the project is individually responsible for conducting their activities to ensure compliance with all applicable project safety and health requirements. The owner and owner's representative are on site as observers and will help to monitor the approved contractor's loss and safety prevention plan and enforce federal, state, and local regulations or codes. The Contractor and the Contractor's Site Safety Manager is responsible for detailed monitoring of construction activities.

1.5 CONTRACTOR SITE SAFETY MANAGER RESPONSIBILITIES

A. The Contractor's Site Safety Manager is responsible for implementing the safety and health plan at the project level. The following specific safety and health plan guide will be followed:

1. Pre-plan work activities through the use of Safe Plans of Action (SPA) in order to identify and control and safety and health issues, which may pose a hazard to employees or others.
2. Contractors are responsible for completing Safe Plans of Action (SPA) and communicating them to employees prior to beginning each work task. This communication of safe work practices will be documented through the Task Safety Awareness meeting and form.
3. Establish and maintain a safe and healthy work environment by adhering to the guidelines and procedures issued in the latest document of the Federal, State, local code, and site-specific requirements.
4. Ensure that all Contractor employees and Subcontractors implement and abide by the safety, health, and security rules and regulations set forth by all regulatory agencies as well as those established by this plan.
5. Hold, at minimum, weekly meetings with Subcontractors to discuss accident prevention measures, review any accident prevention measures, review any accidents which might have occurred since the last meeting, and institute any additional safety measures necessary to prevent future accidents. Meetings will include incidents, which may pose potential third party claim exposures to the District.
6. Assure that Owner's staff is knowledgeable of all Contractor Subcontractor safety and health programs. The safety manager will give special attention to those operations, which require a coordinated effort by the Contractor and Owner.
7. Maintain open and continuing communications between the Owner and the Contractors on safety and health issues.
8. Assure that the safety program general requirements apply to visitors entering the project sites. A visitor's log will be established and maintained at each project.
9. Arrange for specific job safety training for Owner's staff members using or operating special equipment or entering confined spaces and/or the use of other personal protective equipment or other analysis instruments.

10. Require the Contractor personnel complete a thorough investigation of all accidents, occurrences. Reports shall be completed and submitted to the TISD Project Manager within 24 hours after the occurrences.
11. Assure that safety is the FIRST subject of EVERY Contractor/Subcontractor meeting.
12. Review all safety inspection reports with the Subcontractors during the weekly progress meeting.
13. Prior to the construction activity by any Contractor and/or Subcontractor the Safety Manager will assure that all pre-work job safety analysis submittals have been reviewed.
14. Verify the Contractor has no outstanding safety deficiencies that could result in the delay of payment.
15. Assign and manage additional Contractor safety personnel as warranted.
16. Conduct weekly Contractor safety records and performance audits.
17. Attend safety training sessions as required by the Owner.

1.6 OWNER'S RESPONSIBILITIES

A. Review Contractors/Subcontractors safety plan.
B. Make recommendations for administrative action when Contractors fail to correctly identify safety, health, or environmental deficiencies.
C. Attend Contractor/Subcontractor toolbox safety meetings as deemed necessary.

1.7 SAFETY

A. Conduct weekly safety sessions.
B. Attendance: Mandatory for superintendent and foreman for Contractor and each Subcontractor.

End of Section 01 35 23

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control. Testing and Inspection documentation should be generated using the Owner's designated software (Projectmates)

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. Owner will employ and pay for the service of an Independent Testing Laboratory to perform specified testing and laboratory services.

1. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
2. Contractor shall cooperate with the Laboratory to facilitate the execution of its required services.
3. Contractor shall pay for additional samples and tests required for Contractor's convenience or when initial tests indicate work does not comply with Contract Documents.
4. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
5. Specified tests, inspections, and related actions do not limit Contractor's other quality- assurance and -control procedures that facilitate compliance with the Contract Document requirements.
6. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this section.

C. Related Sections:

1. Division 01 Section "Allowances" for testing and inspecting allowances.
2. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
3. Division 01 Section "Execution" for cutting and patching.
4. Divisions 02 through 49 Sections for specific test and inspection requirements.
5. Division 01 Section "Testing, Adjusting, and Balancing for HVAC" (TAB provided by owner)

1.3 DEFINITIONS

A. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

B. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and

acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

C. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

D. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

E. Testing Agency: An entity engaged by the Owner to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

F. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

G. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

C. Conflicts between the specifications and the construction documents. The most stringent requirement will govern.

D. Conflicts on specification requirements. The most stringent requirement will govern.

1.5 INFORMATIONAL SUBMITTALS

A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following, as applicable:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.

6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following as applicable:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and re-inspection.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of factory authorized service representative making report.
   2. Statement that equipment complies with requirements.
   3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   4. Statement whether conditions, products, and installation will affect warranty.
   5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient p roduction capacity to produce required units.
D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329, 'Standards of Recommended Practices for Inspection and Testing Agencies for Concrete and Steel as Used in Construction'; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
    1. NRTL: A Nationally Recognized Testing Laboratory according to 29 CFR 1910.7.
    2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
    1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
    2. Costs for retesting and re-inspection of construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
B. Contractor Responsibilities:
    1. For tests and inspections performed by the Owner's Testing Laboratories:
        a. Cooperate with Laboratory personnel; provide access to Work and to manufacturer's operations.
        b. Secure and deliver to the Laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
        c. Furnish to the Laboratory proposed concrete design mixes, and other material mixes which require evaluation by the Testing Laboratory, a minimum of fourteen (14) days prior to use on the Project.
        d. Furnish incidental labor and facilities
            1) To provide access to Work to be tested.
            2) To obtain and handle samples at the Project site or at the source product to be tested.
            3) To facilitate inspections and tests.
            4) For safe storage and curing of test samples.
            5) Notify Laboratory, PM and Architect sufficiently in advance of operations to allow for Laboratory assignment of personnel and scheduling of tests.
                a) When test or inspections cannot be performed after such notice, reimburse Laboratory for personnel and travel expenses incurred due to Contractor's negligence.
            6) Make arrangements with Laboratory and pay for additional samples, tests, or inspections as required for the Contractor's convenience.
            7) Make arrangements with Laboratory and pay for additional samples and tests required when initial test indicate non-compliance with Contract Documents, including load test.
    2. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
        a. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by

authorities having jurisdiction, whether specified or not.

b. Retain first subparagraph below if some Specification Sections require an independent testing agency to perform certain tests and inspections.
c. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
d. Retain first subparagraph below to assure validity of agencies' reports.
e. Notify testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspecting will be performed.
f. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
4. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
E. Retesting/Re-inspection: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspection, for construction that replaced Work that failed to comply with the Contract Documents.
F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
    1. Schedule times for tests, inspections, obtaining samples, and similar activities.
G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses. .
    1. Distribution: Distribute schedule to Owner, PM, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 EXECUTION

2.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:
    1. Date test or inspection was conducted.
    2. Description of the Work tested or inspected.
    3. Date test or inspection results were transmitted to Architect.
    4. Identification of testing agency or special inspector conducting test or inspection.
B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours. Provide a copy of the log at completion of the project upon request of Architect, owner or owner's representative.

2.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
    1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
B. Protect construction exposed by or for quality-control service activities.
C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

End of Section 01 40 00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Alternates" for products selected under an alternate.
3. Division 01 Section "Substitution Procedures" for requests for substitutions.
4. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in “Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 10 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
    a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
    1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
    2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
    3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
    4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:
    1. Store products to allow for inspection and measurement of quantity or counting of units.
    2. Store materials in a manner that will not endanger Project structure.
    3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
    4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
    5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   2. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Architect will make selection.
   5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
   6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product. Contractor to obtain approval for use of products listed.

B. Product Selection Procedures:
   1. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named

manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Products:
   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
3. Manufacturers:
   b. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
   c. Non-restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
   1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
   2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   3. Evidence that proposed product provides specified warranty.
   4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
   5. Samples, if requested.

PART 3 EXECUTION (Not Used)

End of Section 01 60 00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion.
   2. Final completion.
   3. Warranties.
   4. Final cleaning.

B. Related Sections:
   1. Division 01 Section "Execution" for progress cleaning of Project site.
   2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
   3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
   4. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
   5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of item on the list, and reasons why the Work is not complete.
   2. Advise the Owner of pending insurance changeover requirement.
   3. Grant the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits and similar releases.
   4. Complete startup, commissioning, testing, manufacturer requirements, and corrections of all systems.
   5. Complete Owner’s Training. Instruct Owner’s personnel in operation, adjustment, and maintenance of products, equipment, and systems.
   6. Complete final cleaning requirements, including touch-up painting.
   7. Complete the GC checklist for substantial completion.

Substantial Completion Inspection:

- Ensure that construction is complete prior to occupancy/acceptance.
- Verify the start-up processes have been performed.
- Verify that all systems and equipment are operational as per construction documents and manufacturer’s recommendations
- Review testing performed by others and confirm completeness (e.g. Test and Balance)
- Confirm that the facility is ready for occupancy and utilization for the purpose for which it is intended.

- Provide a systematic development and checking of punch list items.
- Ensure there is a plan in place for correction of pending matters within the time allotted in the contract.
- Verify approval by the Local Authorities having jurisdiction.

Substantial Completion Certificate:

- Establish the date when the work is complete
- Ensure required parties have accepted the work and executed the certificate
- Establish the start date for the warranties.
- Establish the completion of the contract time in order to determine if liquidated damages apply.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining final completion, the items listed in 1.3 of this section must be complete. The Contractor must also complete the following:

1. Submit specific warranties, final certifications, and similar close-out documents.
2. Complete the GC checklist and submit with close-out documents.
3. Prepare and submit Project Record Documents, including construction photographs, damage or settlement surveys, property surveys, and similar record information.
4. Submit test/adjust/balance report records.
5. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.
6. Complete final cleaning and repair of all areas, including touch-up painting.
7. Submit final close-out submittals.
8. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
9. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
10. Instruct Owner’s personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
11. At six and eleven month intervals after the Substantial Completion date, the Maintenance Department, the PM, the A/E, the GC and the District D&C Staff will schedule a warranty meeting to verify that there are no further issues with the work. If additional issues are discovered, they will be integrated into the Warranty Log for completion, or assigned to Facilities Department for resolution if it is determined that the issue maintenance related and not warranty related. The Owner is responsible for coordination of the six and eleven month Warranty meetings.
12. Upon final close out of all contracts, a Close-Out Summary consolidating all record documents, including financial and other pertinent data. All Close-Out Summaries will be used to complete a Program Close out Statement.

B. Close-out submittals include, but are not necessarily limited to, as applicable:
   1. Project Record Documents described in Section 01 78 39.
   2. Certification of Substantial Completion (AIA Form G704)
   3. Certificate of Final Acceptance by the Architect (punch list sign-off)
   4. TEA Certificate of Project Compliance. (see Texas admin code 61.103 6 c 3 f)
   5. TDLR Form (see Texas Gov. Code 469.105)
   6. Final Change Order.
   7. Final Acceptance for Payment to include acceptance of Final Change Order and therefore no work or retainage outstanding
   8. Consent of Surety to Final Payment
   9. Fire Marshall Certificate of Occupancy
   10. Contractor's Final Affidavit of Release of Liens
   11. Contractor's Guarantee (form pending Morris & Rogers, see 3.5.3)
   12. Letter from Contractor listing all subcontractors and suppliers with contact information.
   13. Transmittal listing Keys: Contractor shall prepare an itemized key list in complete detail ending in a statement that the keys were turned over, the Contractor's signature, a line stating that the keys were received and the receiver's signature. Copies of this list should be retained by the Contractor and receiver and a copy sent to the Architect, PM and Owner. Keys should be identified with tags corresponding to the approved room number designation.
   14. Operating, Instruction and Maintenance Manuals for Equipment. For Facilities use, provide one (1) copy of all O&M manuals at substantial completion. For records, provide one (1) copies of all O&M manuals at final closeout. Provide (1) electronic version of O&M manuals on a single usb device.
   15. Verification of training conducted: Provide copy of sign-in sheet. For Facilities use, provide one (1) electronic copy of all training sessions at substantial completion. For records, provide two (1) electronic copy of all training sessions at final closeout.
   16. Final approved submittals for HVAC Controls System, Data Cabling System, and Fire Alarm System, and Security System.
   17. Provide copies of all construction permits closed by the AHJ.
   18. Provide the GC checklist completed.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Contractor.
d. Page number.

4. Submit list of incomplete items in the following format:
   a. PDF electronic file.
   b. Projects using the owner's designated software will require the punch list information to be input on an excel spread sheet. The example of the sheet is at the end of this specification section.

1.6 WARRANTIES

A. Submittal Time: All warranties shall commence on the date of substantial completion unless noted otherwise. Exceptions will have to be approved by architect and owner's representative and notes made on the AIA substantial completion document.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
   4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document. Coordinate paragraph below if Division 01 Section "Operation and Maintenance Data" is used.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an

average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Remove tools, construction equipment, machinery, and surplus material from Project site.
   d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   f. Sweep concrete floors broom clean in unoccupied spaces.
   g. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
   h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   i. Remove labels that are not permanent.
   j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
   k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
      1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.
   o. Clean light fixtures, lamps, globes, and reflectors to function

with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

p. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

End of Section 01 77 00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Operation manuals for systems, subsystems, and equipment.
   3. Product maintenance manuals.
   4. Systems and equipment maintenance manuals.

B. Related Sections:
   1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
   2. Division 02 Section “Demonstration and Training” for instructing Owner’s personnel in the maintenance of the products and in the operation of equipment and systems.
   3. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or sub-systems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:
   1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Architect and owner’s representative.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
      b. Enable inserted reviewer comments on draft submittals.
   2. One (2) paper copy and (2) electronic copies on separate usb devices delivered at substantial completion.
   3. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 calendar days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion. Architect will return copy with comments.
    1. Correct or modify each manual to comply with Architect and owner's representative Comments. Submit copies of each corrected manual within 10 days of receipt of Comments and prior to commencing demonstration and training.

PART 2 PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:
    1. List of documents.
    2. List of systems.
    3. List of equipment.
    4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
    1. Title page.
    2. Table of contents.
    3. Manual contents.

B. Title Page: Include the following information:
    1. Subject matter included in manual.
    2. Name and address of Project.
    3. Name and address of Owner.
    4. Date of submittal.
    5. Name and contact information for Contractor.
    6. Name and contact information for Architect.
    7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
   1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
      b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of content. Indicate volume number for each of the three required multiple-volume sets.
   2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
   4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
   5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
      a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor is delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   6. Normal shutdown instructions.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information,

maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in the manual, identify them by product name, and arrange to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   4. Material and chemical composition.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in the manual, identify by product name and arrange to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.

4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Provide transmittal from district's construction management software for transmittance of extra parts.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 3 EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component

incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
   1. Do not use original project record documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

E. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

End of Section 01 78 23

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.
   4. Miscellaneous record submittals.

B. Related Sections:
   1. Division 01 Section "Execution" for final property survey.
   2. Division 01 Section "Closeout Procedures" for general closeout procedures.
   3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
   4. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit one set(s) of marked-up record prints.
   2. Number of Copies: Submit copies of record Drawings as follows:
      a. Initial Submittal: Submit one paper copy set as well as PDF electronic files of marked-up record prints and two sets of plots from corrected record digital data files on a single USB device. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final Submittal: Submit one paper copy set, a PDF electronic files of marked-up record prints on a single usb device. Print each Drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit as PDF electronic file of Project's Specifications, including addenda and contract modifications on a single usb device.

C. Record Product Data: Submit as PDF electronic file of each approved submittal.
   1. Submit where record Product Data are required as part of operation and maintenance manuals. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy set as well as PDF electronic files of each submittal.

PART 2 PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, submit marked- up record prints to Architect. The Architect will then prepare a full set of corrected digital data files of the Contract Drawings, as follows:
    1. Format: Annotated PDF electronic file.

2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as a paper copy as well as in scanned PDF electronic file(s) of marked up paper copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as a paper copy as well as scanned PDF electronic file(s) of marked up paper copy.

1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

PART 3 EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

End of Section 01 78 39

SECTION 02 41 19 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected building elements.
2. Salvage of existing items to be reused or recycled.
3. Protect all work to remain.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner

C. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Tomball ISD has first salvage rights on all items from the existing buildings prior to demolition. Once TISD removes salvaged items, demolition waste becomes property of Contractor. Items to be salvaged by TISD include, but are not limited to the following:

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project Site.

1. Inspect and discuss condition of construction to be selectively demolished.

2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
4. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove any items to be salvaged by Owner such as smallware.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations. Re-route existing services as required to maintain service for occupants off the site.

1. Maintain fire-protection facilities in service during selective demolition operations.

D. Disconnection of Utilities: Contractor shall contact utility service company to coordinate disconnection of utilities. No disconnection shall take place without prior approval of utility provider.

1.10 WARRANTY

A Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

2.2 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations. Existing utilities shall be re-routed to continue serving those beyond our site.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary." Re-route utilities to provide continuous service to those off site.

E. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment. Salvaged equipment is property of contractor.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

2. Remove receptacles that are not being re-used. Patch walls as required where receptacles are removed.

2.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

D. Wall Prep: Wall surface to be prepared for paint where wall covering is shown to be removed.

2.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations o governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area off-site.
5. Protect items from damage during transport and storage.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition **and cleaned** and reinstalled in their original locations after selective demolition operations are complete.

2.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections as required by recycling company. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

B. Masonry: Demolish in small sections as required by recycling company. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove. Demolish as required by recycling company.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." And methods described in requirements book by hazardous materials consultant.

E. Ground Penetrating Radar: Where concrete flooring or paving must be cut, contractor shall take measures to prevent damaging existing underground services. Contractor shall utilize ground penetrating radar and electrical circuit tracing equipment in the area to be excavated to determine the existence of underground services. In areas of possible underground services, limit the depth of the saw-cutting to less than the thickness of the concrete and breakout the concrete manually with special care.

2.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site **and** legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

2.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Slabs-on-grade.

B. Related Sections:
   1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
   2. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

   1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

   1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect and Engineer.

F. Samples: For waterstops, vapor retarder.

G. Qualification Data: For Installer, manufacturer, testing agency.

H. Welding certificates.

I. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

J. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

K. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

L. Field quality-control reports.

M. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete".
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I, Type I/II, gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F. Or equal to 20% of cement weight is allowable except at polished concrete floor areas.

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm).
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride. Not to be used at polished concrete areas.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
c. Euclid Chemical Company (The), an RPM company;
d. Grace Construction Products, W. R. Grace & Co.; DCI.
e. Sika Corporation; Sika CNI.

C. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
b. Cortec Corporation; MCI- 2000 2005NS.
c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
d. Sika Corporation; FerroGard 901.

2.5 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. BoMetals, Inc.
b. Greenstreak.
c. Paul Murphy Plastics Company.
d. Vinylex Corp.

2. Profile: As indicated.
3. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick).

B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch (10 by 19 mm).

1. Products: Subject to compliance with requirements, provide the following provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

a. Adeka Ultra Seal/OCM, Inc.; Adeka Ultra Seal.
b. Greenstreak; Hydrotite.
c. Vinylex Corp.; Swellseal.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Meadows, W. R., Inc.; Perminator 15 mil.
   b. Stego Industries, LLC; Stego Wrap 15 mil Class A.

B. Fine-Graded Granular Material: Clean mixture of natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete. Not to be used at polished concrete areas unless approved by architect and owner.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
   b. BASF Construction Chemicals - Building Systems; Confilm.
   c. ChemMasters; SprayFilm.
   d. Conspec by Dayton Superior; Aquafilm.
   e. Dayton Superior Corporation; Sure Film (J-74).
   f. Edoco by Dayton Superior; BurkeFilm.
   g. Euclid Chemical Company (The), an RPM company; Eucobar.
   h. Kaufman Products, Inc.; Vapor-Aid.
   i. Lambert Corporation; LAMBCO Skin.
   j. L&M Construction Chemicals, Inc.; E-CON.
   k. Meadows, W. R., Inc.; EVAPRE.
   l. Metalcrete Industries; Waterhold.
   m. Nox-Crete Products Group; MONOFILM.
   n. Sika Corporation; SikaFilm.
   o. SpecChem, LLC; Spec Film.
   p. Symons by Dayton Superior; Finishing Aid.
   q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
   r. Unitex; PRO-FILM.
   s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
    b. BASF Construction Chemicals - Building Systems; Kure 200.
    c. ChemMasters; Safe-Cure Clear.
    d. Conspec by Dayton Superior; W.B. Resin Cure.
    e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
    f. Edoco by Dayton Superior; Res X Cure WB.
    g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
    h. Kaufman Products, Inc.; Thinfilm 420.
    i. Lambert Corporation; AQUA KURE - CLEAR.
    j. L&M Construction Chemicals, Inc.; L&M Cure R.
    k. Meadows, W. R., Inc.; 1100-CLEAR.
    l. Nox-Crete Products Group; Resin Cure E.
    m. Right Pointe; Clear Water Resin.
    n. SpecChem, LLC; Spec Rez Clear.
    o. Symons by Dayton Superior; Resi-Chem Clear.
    p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
    q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

2.8 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

    1. Types I and II, non-load bearing, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

    1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 5 inches (125 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.

B. Foundation Walls: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 5 inches (125 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.

C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.
2. Minimum Cementitious Materials Content: 470 lb/cu. yd. (279 kg/cu. m).
3. Slump Limit: 5 inches (125 mm), plus or minus 1 inch (25 mm).
4. Air Content: 5.5 <Insert number> percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
5. Air Content: 6 <Insert number> percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) 3/4-inch (19-mm) nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.2 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.3 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect or Engineer.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.6 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of

trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

    a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.7 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.
b. Continuous water-fog spray.
c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm).

Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Engineers approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
10. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.

END OF SECTION 03 30 00

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Chain-link fences.
2. Gates: swing.

B. Supply all labor and material to supply and install 8 feet tall chain link security fencing at all campuses to encompass areas shown in plans.

C. Related Sections:

1. Division 03 Section "Cast-in-Place Concrete" for cast-in-place concrete post footings.
2. Division 26 Sections for electrical service and connections for motor operators, controls, limit and disconnect switches, and safety features and for system disconnect switches.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Chain-link fence and gate framework shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to **ASCE/SEI 7**

1. Minimum Post Size: As indicated on Drawings.

a. Wind Loads: 130 MPH.
b. Exposure Category: B.
c. Fence Height: 8 feet.
d. Material Group: IA, ASTM F 1043, Schedule 40 steel pipe.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.

1. Fence and gate posts, rails, and fittings.
2. Chain-link fabric, reinforcements, and attachments.
3. Gates and hardware.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.

C. Product Certificates: For each type of chain-link fence and gate, from manufacturer.

D. Product Test Reports: For framing strength according to ASTM F 1043.

E. Operation and Maintenance Data: For the following to include in emergency, operation, and maintenance manuals:

1. Gate hardware.

F. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has installed chain–link fences and gates similar in material, design and extent to those indicated for this Project and whose work has resulted in a record of successful in–service performance.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:

1. Fabric Height: 8 feet.
2. Steel Wire Fabric: Wire with a diameter of 0.192 inch.

   a. Mesh Size: 2-1/8 inches.

b. Polymer-Coated Fabric: ASTM F 668, Class 2a over zinc-coated steel wire.

1) Color: Black, or as selected by Owner from standard colors, complying with ASTM F 934.

c. Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.

2.2 FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:

1. Fence Height: 96 inches.
2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe.

a. Line Post: 2.875 inches in diameter unless otherwise indicated.
b. End, Corner and Pull Post: 4.0 inches.

3. Horizontal Framework Members: top and bottom rails complying with ASTM F 1043.

a. Top Rail: 1.66 inches.

4. Brace Rails: Comply with ASTM F 1043.
5. Metallic Coating for Steel Framing:

a. Type A, consisting of not less than minimum 2.0-oz./sq. ft. average zinc coating per ASTM A 123/A 123M zinc coating per ASTM A 653/A 653M.

6. Polymer coating over metallic coating.

a. Color: Black, complying with ASTM F 934.

2.3 TENSION WIRE

A. Polymer-Coated Steel Wire: 0.177-inch- diameter, tension wire complying with ASTM F 1664, Class 2a over zinc-coated steel wire.

1. Color: Black, or as selected by Owner from standard colors, complying with ASTM F 934.

2.4 SWING GATES

A. General: Comply with ASTM F 900 for gate posts and single and double swing gate types.

1. Gate Leaf Width: 42-inches.
2. Gate Fabric Height: 96-inches.

B. Pipe and Tubing:

1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish same as fence framing.
2. Gate Posts: Round tubular steel.
3. Gate Frames and Bracing: Round tubular steel.

C. Frame Corner Construction: Assembled with corner fittings.

D. Hardware:

1. Hinges: 180-degree inward swing.
2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

2.5 FITTINGS

A. General: Comply with ASTM F 626.

B. Post Caps: Provide for each post.

1. Provide line post caps with loop to receive tension wire or top rail.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line-to-line posts.

E. Tension and Brace Bands: Pressed steel.

F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:

a. Hot-Dip Galvanized Steel: 0.148-inch- diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.

I. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. zinc.

a. Polymer coating over metallic coating.

2.6 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

2.7 KNOX BOX FOR GATE

A. Rapid Entry System (Fireman's Lock Box):

1. Fire Department Lock Box (main entry): Knox Company No.3200 surface mounted with mounting kit.

2. Provide a Knox Box at each sliding gate in parking/driveway areas.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

1. Install fencing on established boundary lines inside property line.

3.4 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.

C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

D. Line Posts: Space line posts uniformly at 96 inches o.c.

E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

1. Extended along top and bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.

G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

H. Intermediate and Bottom Rails: Install and secure to posts with fittings.

I. Chain-Link Fabric: Apply fabric to inside of enclosing framework. Leave 2 inches between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

1. Selvage: Knuckled at both selvages, double knuckle top and bottom.

J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.

K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.

L. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.5 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware and other moving parts.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION 323113

SECTION 32 31 19 – ORNAMENTAL METAL FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Work includes addition of new ornamental steel fence and bi-parting sliding gates and swinging man-gates, and modification and removal, storage, and re-installation of existing ornamental steel fence and rolling gates.

1. Supply all labor and material to furnish and install a 6-feet tall ornamental metal fence and gates at all campuses to encompass areas indicated in plans.

B. Related Section includes:

1. Deadlock hardware and panic hardware on man-gates as indicated in plans.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For gates. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each fence material and for each color specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for decorative metallic-coated steel tubular picket fences, including finish, indicating compliance with referenced standard.

PART 2 - PRODUCTS

2.1 STEEL AND IRON

A. Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Tubing: ASTM A 500, cold formed steel tubing.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 50, with G90 coating.

E. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, structural quality, Grade 50, with AZ60 coating.

2.2 COATING MATERIALS

A. Epoxy Zinc-Rich Primer for Steel: Complying with MPI #20 and compatible with coating specified to be applied over it.

B. Epoxy Primer for Galvanized Steel: Complying with MPI #101 and compatible with coating specified to be applied over it.

C. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.

D. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.

2.3 MISCELLANEOUS MATERIALS

A. Concrete: Normal-weight concrete complying with requirements in Division 3 Section "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 3000 psi, 3-inch slump, and 1-inch maximum aggregate size.

B. Nonshrink Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107 and specifically recommended by manufacturer for exterior applications.

2.4 ORNAMENTAL STEEL FENCE

A. Ornamental Steel Fences: Fences made from steel tubing and shapes, hot-dip galvanized.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. A & T Iron Works, Inc.
b. Ametco Manufacturing Corporation.
c. BarnettBates Corporation.

B. Posts: Steel tubing – to match existing posts 3/16-inch wall thickness.

C. Post Caps: To match existing, formed from steel sheet and hot-dip galvanized after forming.

D. Rails:

1. Steel Tube Rails: Steel tubing to match existing 1/8-inch wall thickness.
2. Steel Channel Rails: Steel channels to match existing.

E. Pickets: Decorative steel bars of pattern and size to match existing, terminated to match existing.

1. Picket Spacing: 4 inches clear, maximum.

F. Fasteners: Stainless-steel carriage bolts and tamperproof nuts.

G. Fabrication: Assemble fences into sections by welding pickets to rails.

H. Galvanizing: Hot-dip galvanize to comply with ASTM A 123/A 123M.

1. Hot-dip galvanize rail and picket assemblies after fabrication.

I. Finish for Steel Items: Primed, High-performance coating.

1. Color: Black.

2.5 SWINGING GATES

A. General: Comply with ASTM F 1184 for gate posts and bi-parting sliding gate types.

B. Galvanized-Steel Frames and Bracing: Fabricate members to match existing rolling gates, formed from 0.108-inch nominal-thickness, metallic-coated steel sheet or formed from 0.105-inch nominal-thickness steel sheet and hot-dip galvanized after fabrication Pipe and Tubing:

1. Zinc-Coated Steel: Protective coating and finish to match fence framing.
2. Gate Frames and Bracing: To match existing.
3. Gate height: as indicated in plans.

C. Frame Corner Construction: Welded.

D. Hardware:

1. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
2. Hangers, roller assemblies, and stops fabricated to match existing.
3. See plans for additional requirements, including panic devices at man-gates.

2.6 CANTILEVER SLIDE GATE

A. Sliding gate height: as indicated in plans.

B. Gate frame: two (2) 2 inch square aluminum members, ASTM B221, alloy and temper 6063-T6.

1. Weld members together forming a rigid integrated enclosed gate track and rail. Provide two (2) truck assemblies for gate leaf. Bottom rail 2 inch by 4 inch aluminum member. Gates over 27 feet long in single opening shall be shipped in 2 parts and field spliced with special attachments provided by the manufacturer.
2. For gate openings over 15 feet, weld internal uprights 1 inch by 2 inch aluminum members in gate frames at maximum 6'-2" face to face, subdividing frame into panels. Gates under 15 feet shall have two equal panels.

C. Ornamental Picket Infill: 1-3/8 inch wide x 1-1/2 inch deep, 11 gauge wall thickness aluminum "U" channel. Punch rails to receive pickets and weld inside gate frame. Pickets 1 inch galvanized square steel tubular members per ASTM A787, having a 45,000 psi of gauge, spacing, and accessories to match fence. Pickets are riveted to "U" rails using 1/4 inch industrial drive rivets.

D. Provide diagonal adjustable length truss rods, of 3/8 inch galvanized steel, in each panel of gate frame.

E. Enclosed Gate Track: Integrated enclosed gate track and rail, aluminum extrusion. Track to withstand reaction load of 2,000 pounds.

F. Internal-Roller Assembly: Swivel type, zinc die cast with four (4) double sealed steel ball bearing rollers 2 inches in diameter by 9/16 inch wide, and two (2) side rolling wheels to ensure roller alignment in track. Mount rollers on post brackets using 7/8 inch diameter ball bolts with 1/2 inch shank. Design roller assembly to withstand same reaction load as track.

G. Gate Hardware: Gate hangers, latches, brackets, guide assemblies, and stops of malleable iron or steel, galvanized after fabrication. Provide positive latch with provisions for padlocking.

H. Bottom Roller Guide: Each roller guide assembly shall consist of two (2) 4 inch diameter rubber wheels, straddling bottom horizontal gate rail, allowing adjustment to maintain gate frame plumb and in proper alignment. Attach one assembly to each support post.

I. Gate Posts: Galvanized steel 4 inch square. Provide one (1) latch post and two (2) support posts for single slide gates and four (4) support posts for double slide gates.

J. Electrical Motor: Provide motor and electrical connections as instructed by gate manufacturer for type and size of application.

2.7 MOTOR OPERATION FOR SLIDING GATES

A. Gate Operator:
B. Approved Product/Manufacturer: Model SL585 slide gate operator and accessories as manufactured by Stanley Access Technologies or approved equal.

1. Number Required: Refer to plans.
2. LiftMaster SL585 Industrial Gear-Driven Slide Gate Operator.
3. Compliance: UL 325 listed, UL 991 and CSA C22.2 No. 247 standards.
4. Ratings: Class II
5. Warranty: 2 years.
6. Operator Speed: 11 inches (279.4 mm) per second.
7. Electrical Power Requirements: 115/208/230V AC, single phase, 60 Hz.
8. Accessory Electrical Power Requirements: 24V AC.
9. Gear Reduction: 20:1 wormgear reducer in synthetic oil bath.
10. Motor: 1 HP, continuous duty
11. capacity: Supports gate lengths up to 70 feet (21 m) and gate weights up to 1,600 pounds (725 kg).
12. Recommended Cycles per Hour: 20.
13. Metal Frame: 7-gauge pre-galvanized steel.
14. Chassis: Powder-coated galvanized steel.
15. Enclosure: Weather-resistant, lockable, 16-gauge steel cover.
16. Chain: #50 nickel-plated, 25 feet (7620 mm) supplied with each unit.
17. Gearbox: All-weather.
18. Built-in Receiver: Single remote control solution for gate access, extra access points.
19. Integrated 3-Button Control Station: 3-button control station incorporated into the outside of the control box.
20. Inherent Obstruction Sensing: Offers separate force adjustments for both the open and closed directions. If the gate strikes an obstruction, a closing gate will reverse to open and an opening gate will stop.
21. External Obstruction Sensing: Input connections are provided for external contact and non-contact sensors, such as photo eyes and edge devices.
22. Advanced Dual-Gate Operation: 2-wire system allows the operation of 2 separate gate operators in unison at a single entrance; accessories connect to either operator.
23. Sequenced Access Management: Capable of sequentially controlling the operator in tandem with a barrier gate.

24. LED Indicators: Operator input, status and diagnostic LEDs.
25. Control Inputs: Allow the connection of optional external devices like loop detectors, access control systems and radio receivers.
26. Digital Logic Control: Supports long-distance control wiring runs of over 1,000 feet (305 m).
27. Surge and Spike Protection: Circuitry designed to provide protection from external spikes or surges.
28. Warning Device: UL 325 compliant entrapment warning alarm has ability to be set for pre-operation warning; provides 3-second warning prior to and during gate movement.
29. External Alarm Reset Button: Allows for quick reset of the gate operator when the alarm has been activated.
30. Timer-to-Close: Adjustable timer can be set from 1 to 180 seconds. Unit automatically resets upon receiving any additional open commands.
31. Maximum Run Timer: Protects against damage to the gate and operator by limiting the unit's run time to 120 seconds.
32. External Manual Disconnect: Allows gate to be opened in the event of a power loss without removing the operator cover.
33. Mechanical Braking: The mechanical braking system adds substantial gate position control at all points in travel. The solenoid-actuated brake system also prevents the gate from being back-driven.
34. Limit Settings: Driven limit nut switches are fully adjustable.
35. Lockable Hinged Access Door: Weather-resistant, lockable, hinged design allows access to the unit's electronics for installation or servicing needs.
36. Accessories: Provide the optional accessories listed below.
37. LiftMaster KPR2000 Single Access Control Keypad and Proximity Reader.
38. LiftMaster SNACPKH32 Proximity Key – Provide 6 proximity keys.
39. LiftMaster PED42 Gooseneck pedestal
40. LiftMaster 142A0271 Trim plate kit
41. LiftMaster PS12D2A Power supply

2.8 ACCESSORIES

A. Rail Attachment Brackets - Die cast of zinc (ZAMAK #3 Alloy) in accordance with ASTM B86-83Z 33521. Ball and socket design capable of 30° swivel (up/down-left/right). Bracket to fully encapsulate rail end for complete security. (no substitution)

B. Industrial Drive Rivets: Of sufficient length to attach items in a secure non-rattling position. Rivet to have a minimum of 1100 lbs. holding power and a shear strength of 1500 lbs.

C. Ornamental Picket Fence Accessories: Provide indicated items required to complete fence system. Galvanize each ferrous metal item in accordance with ASTM B695 and finish to match framing.

D. Post Caps: Formed steel, cast of malleable iron or aluminum alloy, weathertight closure cap. Provide one ball style post cap for each post.

E. Rings: Cast aluminum. Attach ring to top rail by inserting mounting blocks into top rail and riveting through side of rail using ¼-inch industrial drive rivet. Hold bottom of ring in place by dowel that protrudes from ring through pre-drilled hole in bottom rail.

F. Picket Tops: Flat tops extending above rail.

2.9 KNOX BOX FOR GATE

A. Rapid Entry System (Fireman's Lock Box):

1. Fire Department Lock Box (main entry): Knox Company No.3200 surface mounted with mounting kit.
2. Provide a Knox Box at each sliding gate in parking/driveway areas.

2.10 METALLIC-COATED STEEL FINISHES

A. Galvanized Finish: Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a zinc-phosphate conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

C. Powder Coating: TGIC polyester powder-coat finish, with a minimum dry film thickness of 2 mils.

1. Color and Gloss: To match existing.

PART 3 - EXECUTION

3.1 ORNAMENTAL FENCE INSTALLATION

A. Install fences according to manufacturer's written instructions.

B. Install fences by setting posts as indicated and fastening rails to posts. Peen threads of bolts after assembly to prevent removal.

C. Post Excavation: Excavate holes to a diameter of not less than 4 times post size and a depth of not less than 24 inches plus 3 inches for each foot or fraction of a foot that fence height exceeds 4 feet.

D. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Hold posts in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
3. Posts Set in Concrete: Extend post to within 6 inches of specified excavation depth, but not closer than 3 inches to bottom of concrete.
4. Space posts uniformly as indicated on Drawing.

E. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

END OF SECTION 32 31 19