STATEWIDE FABRIC SALT BARNS OPEN-END FY 17-19
CONTRACT NO. T201480107

INDEX TO TECHNICAL SPECIFICATIONS

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SECTION 011000

SUMMARY

PART 1 - DESCRIPTION

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.

B. Standard Specifications – Specifications for Road and Bridge Construction, The Delaware Department of Transportation.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased Construction
4. Access to site.
5. Coordination.
6. Work restrictions.
7. Specification and drawing conventions.
8. Miscellaneous provisions.

1.3 PROJECT INFORMATION

A. Project Identification: T201480107, Statewide Fabric Salt Barns, Open-End FY17-19.

1. Project Location: Statewide.

B. Owner: Delaware Department of Transportation.

1. Owner's Representative:

C. Engineer: Johnson Mirmiran & Thompson.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of providing all coordination, engineering, materials, labor, and equipment necessary to design,

engineer, fabricate, supply and install the fabric covered steel frame system with a tensioned fabric membrane cover, and overhead motorized door, to be supported by a new foundation system designed for the reactions of the fabric covered steel frame system and all else necessary to provide the project complete.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

A. The Site utility Work shall be conducted in phases.

1. All new work shall be completed prior to termination and removal of existing services.
2. Contractor must notify the owner in writing at least two weeks in advance of any utility interruptions.

B. Before commencing with work related to removal of existing power and communications, notify the owner for coordination purposes. All new services shall be proofed out and in operations prior to removal of existing services.

1.6 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to the indoor and outdoor areas as designated on the contract drawings.
2. Driveways, Walkways and Entrances: Keep driveways loading areas**,** and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Maintenance Building: Maintain access to the existing building until the new structures have been granted Certificate of Occupancy.

1.7 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and existing buildings during entire new building construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.8 COORDINATION WITH OTHER CONTRACTS

A. Owner will coordinate between Contracts T201480107 and T201680107. Contractor shall supply Owner submittals and any requested information in a timely manner for coordination with Contract T201680107, Statewide Fabric Salt Barn Foundations, Open-End, FY 17-19, before and during the construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate coordination. Provide the work so as not to delay the coordination efforts and the schedule.

1.9 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

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

B. On-Site Work Hours: Limit work in existing buildings to normal business working hours, Monday through Friday, unless otherwise indicated.

C. Existing Utility Interruptions: For the interruption of utility services to this facility, notify the owner not less than two days in advance of the proposed utility interruption.

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

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.11 ELECTRICAL WORK PHASES

A. Work phasing indicated herein is only noted for specific areas of the project and in not intended to itemize all tasks under this contract. Also, the phasing listed herein is not intended to restrict the Contractor to this specific phasing. Although, in some cases, work must be completed one phase at a time, several steps within each phase may be done simultaneously. Contractor may submit its own phasing schedule to COTR for review and written approval. The COTR reserves the right to reject any alternate phasing plan for any reason and require that the phasing plan presented herein be followed. The existing Crew Quarters is to remain occupied and functional throughout the construction of the new facility.

B. Schedule the execution of the Work according to the phasing sequence indicated below and as shown on drawings to avoid interference with normal functions of the facility.

C. At least 14 calendar days before commencing Work, contractor shall submit a schedule to COTR showing the sequence, the commencement and completion dates for review and written approval showing the sequence, the commencement and completion dates. Schedule the execution of the work according to phasing plans, meeting the objectives of the sequence indicated herein and to avoid interference with normal functions of the facility operations. Therefore, demolition and new work must be scheduled for review and approval by the COTR two week prior to commencement of work including any work requiring outages of power, data, or communications system. All efforts must be taken to avoid systems outages. When outages are required, they must be of limited durations and shall occur during off business hours. Changes to this schedule must be communicated to the COTR at lease three days prior to the change being implemented.

PART 2 - MATERIALS (Not Used)

PART 3 - CONSTRUCTION METHODS (Not Used)

PART 4 - METHODS OF PAYMENT (Not Used)

PART 5 - BASIS OF PAYMENT (Not Used)

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SECTION 012500

SUBSTITUTION PROCEDURES

PART 1 - DESCRIPTION

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 substitutions.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling change request to the contract from substitutions made after the Contract award.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

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

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Certificates and qualification data, where applicable or requested.
f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
i. Cost information, including a proposal of change, if any, in the Contract Sum.
j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Owner's Action: If necessary, the Owner will request additional information or documentation for evaluation. The Owner will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Supplemental Instructions for minor changes in the Work.
b. Use product specified if Owner does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise, coordinate, or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - MATERIALS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Owner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. Requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated by the Owner.

PART 3 - CONSTRUCTION METHODS (Not Used)

PART 4 - METHODS OF PAYMENT (Not Used)

PART 5 - BASIS OF PAYMENT (Not Used)

END OF SECTION

SECTION 012600

CONTRACT MODIFICATION PROCEDURES

PART 1 - DESCRIPTION

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 handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

2. Section 012900 "Payment Procedures" for administrative and procedural requirements necessary to prepare and process applications for payment.

1.3 MINOR CHANGES IN THE WORK

A. Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Owner will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by the Owner are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Quotation Form: Use forms provided by Owner.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to the Owner.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form provided by Owner.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, the Owner will issue a Change Order for signatures of Owner and Contractor.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Owner may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - MATERIALS (Not Used)

PART 3 - CONSTRUCTION METHODS (Not Used)

PART 4 - METHODS OF PAYMENT (Not Used)

PART 5 - BASIS OF PAYMENT (Not Used)

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SECTION 012900

PAYMENT PROCEDURES

PART 1 - DESCRIPTION

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 necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Owner at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

        1) Labor.
        2) Materials.
        3) Equipment.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports.
4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

5. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
6. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
7. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use forms acceptable to DelDOT for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.

2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.

3. Provide summary documentation for stored materials indicating the following:

a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

4. Emptying and stockpiling of salt will be done by DelDOT.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Owner by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. Copies of building permits.
8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
9. Initial progress report.
10. Report of preconstruction conference.
11. Certificates of insurance and insurance policies.
12. Performance and payment bonds.
13. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After issuance of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. Evidence that claims have been settled.
7. Final liquidated damages settlement statement.

PART 2 - MATERIALS (Not Used)

PART 3 - CONSTRUCTION METHODS (Not Used)

PART 4 - METHODS OF PAYMENT (Not Used)

PART 5 - BASIS OF PAYMENT (Not Used)

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SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - DESCRIPTION

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 provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Written Request from Owner, Construction Manager**,** Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. 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. Use CSI Form 1.5A**.** 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.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordinate between Contracts T201480107 and T201680107. Contractor shall supply Owner submittals and any requested information in a timely manner for coordination with Contract T201680107, Statewide Fabric Salt Barn Foundations, Open-End, FY 17-19, before and during the construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate coordination. Provide the work so as not to delay the coordination efforts and the schedule.
The work includes, but is not limited to; providing all coordination, materials, labor, and equipment necessary to design, engineer, fabricate, supply, anchor, and install a fabric covered steel frame system with a tensioned fabric membrane cover, and motorized over-head doors, to be supported by a new foundation system designed for the reactions of the fabric covered steel frame system and all else necessary to provide the project complete.

C. This work shall include the all coatings, finishing, testing, and work including but not limited to: setting embedded items and anchors, joints, and miscellaneous work associated with the Section of the Statewide Fabric Salt Barns. All other related structures associated with the Fabric Salt Barn, including but not limited to, miscellaneous items, and infill, shall also be included so as the Work shall be complete and in place.

D. Contractor's general coordination work includes, but is not limited to facilitate complete in place and accurately construction of the entire Statewide Fabric Salt Barn building; anchor bolt locations prior to fabrication, coordinate overhead doors location of concrete embedded plates and angles and headed studs, and overhead door frames and attachments.

E. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

F. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

G. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

H. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Ceiling Plans: Show architectural, structural elements, and electrical Work. Supplement plan drawings with section drawings where required to adequately represent the Work.

2. Electrical Work: Show the following:

a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
d. Location of pull boxes and junction boxes, dimensioned from column center lines.

3. Review: Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Engineer determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Engineer will so inform Contractor, who shall make changes as directed and resubmit.

4. Retain "Coordination Drawing Prints" Subparagraph below if submittal of prints is adequate for review of coordination drawings and electronic file submittal for review or record is not required.

5. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit a written RFI in the form specified.

1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Engineer and Owner.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Engineer.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven cumulative working days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for approval of Contractor's means and methods.
   d. Requests for coordination information already indicated in the Contract Documents.
   e. Requests for adjustments in the Contract Time or the Contract Sum.
   f. Requests for interpretation of Engineer's actions on submittals.
   g. Incomplete RFIs or inaccurately prepared RFIs.

2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.
3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Owner and Engineer in writing within 5 business days of receipt of the RFI response and prior to the execution of the work.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Engineer.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Engineer's response was received.

F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify the Owner and Engineer within 5 business days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: DelDOT will be responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Contractor and Engineer, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Lines of communications.
f. Procedures for processing field decisions and Change Orders.
g. Procedures for RFIs.
h. Procedures for testing and inspecting.
i. Procedures for processing Applications for Payment.
j. Distribution of the Contract Documents.
k. Submittal procedures.
l. Preparation of record documents.
m. Use of the premises.
n. Work restrictions.
o. Working hours.

p. Owner's occupancy requirements.
q. Responsibility for temporary facilities and controls.
r. Procedures for moisture and mold control.
s. Procedures for disruptions and shutdowns.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.

4. Minutes: DelDOT will be responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner and Engineer of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Possible conflicts.
i. Compatibility requirements.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's written instructions.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.
q. Space and access limitations.
r. Regulations of authorities having jurisdiction.
s. Testing and inspecting requirements.
t. Installation procedures.
u. Coordination with other work.
v. Required performance results.
w. Protection of adjacent work.

x. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: DelDOT will distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Engineer, but no later than 30 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of record documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Submittal of written warranties.
    d. Requirements for preparing operations and maintenance data.
    e. Requirements for delivery of material samples, attic stock, and spare parts.
    f. Requirements for demonstration and training.
    g. Preparation of Contractor's punch list.
    h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    i. Submittal procedures.
    j. Retain first subparagraph below for projects with separate contracts that may impact Contractor's work and procedures at project closeout.
    k. Coordination of separate contracts.
    l. Owner's partial occupancy requirements.
    m. Installation of Owner's furniture, fixtures, and equipment.
    n. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: DelDOT will conduct progress meetings at monthly intervals.

1. Coordinate dates of meetings with preparation of payment requests.

2. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Resolution of BIM component conflicts.
        4) Status of submittals.
        5) Deliveries.
        6) Off-site fabrication.
        7) Access.
        8) Site utilization.
        9) Temporary facilities and controls.
        10) Progress cleaning.
        11) Quality and work standards.
        12) Status of correction of deficient items.
        13) Field observations.
        14) Status of RFIs.
        15) Status of proposal requests.
        16) Pending changes.
        17) Status of Change Orders.
        18) Pending claims and disputes.
        19) Documentation of information for payment requests.

4. Minutes: DelDOT will conduct the meeting and will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or

recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - MATERIALS (Not Used)

PART 3 - CONSTRUCTION METHODS (Not Used)

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

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SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

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 documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's Construction Schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Site condition reports.
6. Unusual event reports.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for preparing a Submittal Schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF file.

B. Startup construction schedule.

1. Submittal of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

E. Daily Construction Reports: Submit at weekly intervals.

F. Site Condition Reports: Submit at time of discovery of differing conditions.

G. Unusual Event Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures**,** including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.

2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

2. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
3. Startup and Testing Time: Include no fewer than 15days for startup and testing.
4. Commissioning Time: Include no fewer than 15days for commissioning.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer’s and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.

d. Partial occupancy before Substantial Completion.
e. Use-of-premises restrictions.
f. Provisions for future construction.
g. Seasonal variations.
h. Environmental control.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:

1. Temporary enclosure and space conditioning.

F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

H. Contractor's Construction Schedule Updating: At weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

I. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

J. Distribution: Distribute copies of approved schedule to Engineer, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.

2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.

1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.10 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.

15. Change Orders received and implemented.
16. Construction Work Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

C. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1. Submit unusual event reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - DESCRIPTION

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 Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Engineer'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 do not require Engineer’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. 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 revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Engineer’s final release or approval.
    g. Scheduled date of fabrication.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Engineer’s Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.

B. Reproduction of Contract Documents: Reproduction of engineer’s contract drawings and specifications for the use as submittals will not be permitted.

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. Engineer 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 Engineer 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 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer 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 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Engineer's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Engineer and to Engineer's consultants, allow 15 days for review of each submittal. Submittal will be returned to Engineer before being returned to Contractor.

E. Processing Time: Allow time for RFI review, as follows. Time for review shall commence on Engineer receipt of RFI. No extension of the Contract Time will be authorized because of failure to transmit RFI enough in advance of the Work to permit processing.

1. Initial Review: Allow 15 days for initial review of each RFI. Allow additional time if coordination with subsequent RFIs is required. Engineer will advise Contractor when a RFI being processed must be delayed for coordination.
2. Sequential Review: Where sequential review of RFIs by Engineer's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each RFI.
3. Concurrent Consultant Review: Where the Contract Documents indicate that RFIs may be transmitted simultaneously to Engineer and to Engineer's consultants, allow 15 days for review of each RFI. RFI will be returned to Engineer before being returned to Contractor.
4. Submit RFI's in a type written and executable word format.

F. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner**,** containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Engineer.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of firm or entity that prepared submittal.
    g. Names of subcontractor, manufacturer, and supplier.
    h. Category and type of submittal.
    i. Submittal purpose and description.
    j. Specification Section number and title.
    k. Specification paragraph number or drawing designation and generic name for each of multiple items.
    l. Drawing number and detail references, as appropriate.
    m. Location(s) where product is to be installed, as appropriate.
    n. Related physical samples submitted directly.
    o. Indication of full or partial submittal.
    p. Transmittal number.
    q. Submittal and transmittal distribution record.
    r. Other necessary identification.
    s. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal 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 Engineer.

H. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from

requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

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 Engineer action stamp.

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

PART 2 - MATERIALS

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. Action Submittals: Submit one paper copies of each submittal unless otherwise indicated.
2. Informational Submittals: Submit one paper copies of each submittal unless otherwise indicated. Engineer will not return copies.
3. 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.

a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

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.

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:

    a. PDF electronic file.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

    a. PDF electronic file.

E. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

F. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

J. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

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

L. Installer Certificates: Submit written 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.

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

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

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

P. Material Test Reports: Submit reports 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.

Q. Product Test Reports: Submit written reports indicating that 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.

R. Research Reports: Submit written 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.

S. Preconstruction Test Reports: Submit reports written 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.

T. Compatibility Test Reports: Submit reports written 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.

U. Field Test Reports: Submit written reports 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.

V. Design Data: Prepare and submit written 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 of software, if any, used for calculations. Include page numbers.

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.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies 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 - CONSTRUCTION METHODS

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 Engineer.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. 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 ENGINEER’S ACTION

A. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action**.**

B. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.

D. Incomplete submittals, or reproductions of engineers contract drawings or specifications are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Engineer without action.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

SECTION 014000

QUALITY REQUIREMENTS

PART 1 - DESCRIPTION

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.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. 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.
2. 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.
3. Requirements for Contractor to provide quality-assurance and control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. 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 Engineer.

C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to the Engineer, to establish product performance and compliance with specified requirements.

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

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

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

H. 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(s).

I. 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 Engineer for a decision before proceeding.

1.5 ACTION SUBMITTALS

A. Shop Drawings: Provide comprehensive plans, sections, and elevations, indicating materials and size of construction.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Engineer.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Engineer.

D. 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.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

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.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager shall not have other Project responsibilities.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Inspection of Workmanship: Describe process for inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

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 reinspecting.

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.

1.9 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 production 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 product that are similar in material, design, and extent to those indicated for this Project.

F. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

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.

1.10 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. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting 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: 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.

1. 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.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. 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 Section 013300 "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 preinstallation 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/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.

6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. 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.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - MATERIALS (Not Used)

PART 3 - CONSTRUCTION METHODS

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: 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 revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

3.2 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 Section 017300 "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.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

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SECTION 017300

EXECUTION

PART 1 - DESCRIPTION

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 general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013100 "Project Management and Coordination for administrative Submittal Procedures" for submitting surveys.
3. Section 013300 "Submittal Procedures" for submitting surveys.
4. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Owner of locations and details of cutting and await directions from Owner before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - MATERIALS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - CONSTRUCTION METHODS

3.1 EXAMINATION

A. Existing Conditions: The existence and location of utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of utilities, mechanical and electrical systems, and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, lines, services, or other appurtenances located in or affected by construction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Owner.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the existing benchmarks. If discrepancies are discovered, notify Owner promptly.

B. Building Lines and Levels: Locate and lay out control lines required for work. Transfer survey markings and elevations for use with control lines and levels.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
4. Exterior Building Walls: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

PART 4 - METHODS OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

SECTION 017700

CLOSEOUT PROCEDURES

PART 1 - DESCRIPTION

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 procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 013100 "Project Management and Coordination" for administrative provisions for coordinating construction operations on Project

2. Section 017300 "Execution" for progress cleaning of Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.
5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Complete startup and testing of systems and equipment.
3. Perform preventive maintenance on equipment used prior to Substantial Completion.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
5. Advise Owner of changeover in heat and other utilities.
6. Terminate and remove temporary facilities from Project site, along with construction tools, and similar elements.
7. Complete final cleaning requirements, including touchup painting.

8. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Owner will either proceed with inspection or notify Contractor of unfulfilled requirements. final Certificate for Payment will be prepared by Owner after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 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 items by major element.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Owner for designated portions of the Work when delay in submittal of warranties might limit Owner's rights under warranty.

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

PART 2 - MATERIALS

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 - CONSTRUCTION METHODS

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 designated 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. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Remove snow and ice to provide safe access to building.

f. 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.

g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

h. Sweep concrete floors broom clean in unoccupied spaces.

i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials.

j. Remove labels that are not permanent.

k. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

l. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

m. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

n. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with Owner waste disposal.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

PART 4 - METHODS OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

B. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

C. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - DESCRIPTION

1.1 REFERENCES

A. Reference Standards: In addition to requirements shown or specified, comply with applicable provisions of following for design, materials, fabrication, and installation of component parts:

1. Chapter I - Joints and Chapter II - Sealants of SWR "Sealants: The Professionals' Guide;" Sealant, Waterproofing and Restoration Institute.

1.2 SUBMITTALS

A. Include product data to indicate chemical characteristics, performance criteria, limitations, substrate preparation, installation requirements, and curing requirements.

1. Indicate locations where sealants will be used.

B. Include product information for accessories and other required components.

C. Include color charts indicating manufacturer's full color range available of each sealant type for Engineer's initial selection.

1.3 QUALITY ASSURANCE

A. Single Source Responsibility: Provide products for each sealant system from one manufacturer for entire Project, unless otherwise acceptable to Engineer.

1.4 PROJECT CONDITIONS

A. Environmental Requirements: Do not apply sealants to wet or frozen surfaces.

1. Apply sealant when following are within manufacturer's limits during and for 24 hours after sealant installation:

a. Ambient and surface temperatures.
b. Relative humidity.

2. Comply with manufacturer's requirements regarding application of sealants in vicinity of curing sealants of a different material.

PART 2 -MATERIALS

2.1 JOINT SEALANT MATERIALS AND MANUFACTURERS

A. Polyurethane—Multi-Component (Designation U-MC): ASTM C920, Type M, Grade NS, Class 25.

1. Uses: T (Traffic Grade), NT (Non-traffic) grade as required.
2. Chemical curing, non-staining, and non-bleeding.
3. Joint Movement Range without Cohesive/Adhesive Failure: Plus 25 percent to minus 25 percent of joint width.
4. Color: Selected by Engineer from manufacturer's full color range.
5. Acceptable Products:

    a. Dynatrol II, Pecora, Harleysville, PA.
    b. Sikaflex-2c NS, Sika, Lyndhurst, NJ.
    c. Sonolastic NP-2, Sonneborn, Minneapolis, MN.
    d. Dymonic, Tremco, Cleveland, OH.

2.2 ACCESSORIES

A. Joint Cleaner: Chemical cleaners required by sealant manufacturer for substrates encountered, compatible with sealant backing bond breaker materials.

B. Primer: Dyed coating material required by sealant manufacturer for enhancing sealant adhesion to joint substrates.

C. Cylinder Sealant Backing Bond Breaker Rod: General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing meeting ASTM C1330, ASTM D1056 and D1565 and of the size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Open Cell Polyurethane: Use not permitted unless required by sealant manufacturer.
2. Closed Cell Polyethylene: Non-absorbent to liquid water.

    a. Use in wall and ceiling joints unless otherwise required by sealant manufacturer.

3. Reticulated Polymeric: Soft-Rod, Nomaco Inc, Zebulon, NC.
4. Unless otherwise required by sealant manufacturer, oversize rod shall be larger than joint width by following minimum amounts:

    a. Open Cell Polyethylene: 50 percent.
    b. Closed Cell Polyethylene: 33 percent.
    c. Reticulated Polymeric: 25 percent.

D. Sealant Backing Bond Breaker Tape: Pressure sensitive polyethylene tape or tetrafluorethylene self-adhesive tape required by sealant manufacturer to suit application.

1. Minimum thickness of 11 mils (0.275 mm).

E. Tooling Liquids: Non-staining material approved by manufacturer to reduce adhesion of sealant to joint finishing tools.

PART 3 - CONSTRUCTION METHODS

3.1 EXAMINATION AND PREPARATION

A. Examination: Verify that sealant backing is compatible with sealant.

1. Verify that Substrate Surface:

a. Is within manufacturer's moisture content range.
b. Complies with manufacturer's cleanliness and surface preparation requirements.

2. Joint Width: Verify joints are greater than minimum widths required by manufacturer.

a. If joints are narrower than minimum required widths, widen narrow joints to indicated width.
b. Do not place sealant in joints narrower than manufacturer's required minimum.

B. Preparation: Comply with ASTM C1193.

1. Prepare, clean, and prime joints in accordance with manufacturer's instructions.
2. Priming: Comply with manufacturer's sequencing requirements for joint priming and sealant backing bond breaker rod installation to assure required primer application coverage and rate without placement of primer on backer rod surface to be in contact with sealant and avoid three-sided sealant adhesion.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
4. Use masking tape to protect surfaces adjacent to recessed tooled joints.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile

3.2 APPLICATION

A. Joint Sealants: Comply with manufacturer's printed instructions.

B. Cleaning: Clean excess sealants and sealant smears from adjacent surfaces as application progresses.

1. Repair or replace defaced or disfigured finishes caused by work of this Section and replace where installation techniques result in unsatisfactory joining of materials and unsightly conditions.

C. Protection: Protect sealants from contamination until cured.

1. Protect sealant joints in horizontal surfaces from foot and vehicular traffic until cured.

3.3 SCHEDULE

A. Joint Sealant Schedule for Exterior Locations:

1. Wall Joints: Polyurethane, two-component, non-sag, sealant.

B. Joint Sealant Schedule for joints in horizontal traffic surfaces.

1. Sealant type, and joint locations: Polyurethane, two-component, non-sag, sealant, traffic grade (T). For joints at paving doorways, and thresholds.

C. Joint-Sealant Schedule for joints in vertical joints between concrete and door frames:

1. Polyurethane, two-component, non-sag, sealant.

D . For joints in other locations to complete construction.

1. Polyurethane, two-component, non-sag, sealant.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

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SECTION 099113

EXTERIOR PAINTING

PART 1 - DESCRIPTION

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
   1. Galvanized metal.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples: For each type of paint system and each color and gloss of topcoat.

C. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Owner will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 32 sq. ft.
b. Other Items: Owner will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Owner at no added cost..

PART 2 - MATERIALS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product available products that may be incorporated into the Work include, but are not limited to, with Engineer's approval, products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each primer and paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Owner from manufacturer's full range.

2.3 METAL PRIMERS

A. Primer, Steel Surfaces, phenolic Alkyd, Anti-Corrosive for Metal: MPI #79.

1. Primer, high solids, low VOC, heavy metal free, phenolic Alkyd, Anti-Corrosive for Metal: MPI #79, and certified in writing by topcoat manufacturer to be compatible with intermediate and topcoat.

a. Basis of Design: Kem Bond HS, Universal Metal Primer, Sherwin Williams.

B. Primer, Galvanized Steel Surfaces, phenolic Alkyd, Anti-Corrosive for galvanized Metal: MPI #79:

1. Primer, high solids, low VOC, heavy metal free, phenolic Alkyd, Anti-Corrosive for Metal: MPI #79, and certified in writing by topcoat manufacturer to be compatible with; galvanized steel, intermediate and topcoat.

a. Basis of Design: Kem Bond HS, Universal Metal Primer, Sherwin Williams.

2.4 SOLVENT-BASED PAINTS

A. Alkyd, Gloss (Gloss Level 6): MPI #48.

1. High solids, low VOC, alkyd, gloss: MPI #48, and certified in writing by manufacturer to be compatible with primer coat.

a. Basis of Design: Industrial Enamel HS, Sherwin Williams.

PART 3 - CONSTRUCTION METHODS

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and primer and paint systems indicated for surface preparation.

B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Engineer, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Steel Substrates: Applied to hollow metal doors and frames, and steel surfaces unless otherwise noted by other sections.

1. Coating System:

a. Prime Coat: Primer, phenolic alkyd, anti-corrosive for metal, MPI #79.
   1) 1-coat at minimum dry film thickness of 5.0 mils/coat.
b. Intermediate Coat: High Solids, alkyd, Industrial Enamel HS, matching topcoat, gloss level 6, MPI #48.
   1) 1-coat at minimum dry film thickness of 4.0 mils/coat.
c. Topcoat: High Solids, alkyd, Industrial Enamel HS, gloss level 6, MPI #48.
   1) 1-coat at minimum dry film thickness of 4.0 mils/coat.

B. Galvanized-Metal Substrates: Applied to hollow metal doors and frames, and steel surfaces unless otherwise noted by other sections.

1. Coating System:
    a. Prime Coat: Primer, phenolic alkyd, anti-corrosive for metal, MPI #79.
        1) 1-coat at minimum dry film thickness of 5.0 mils/coat.
    b. Intermediate Coat: High Solids, alkyd, Industrial Enamel HS, matching topcoat, gloss level 5, MPI #48.
        1) 1-coat at minimum dry film thickness of 4.0 mils/coat.
    c. Topcoat: High Solids, alkyd, Industrial Enamel HS, gloss level 5, MPI #48.
        1) 1-coat at minimum dry film thickness of 4.0 mils/coat.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

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SECTION 099123

INTERIOR PAINTING

PART 1 - DESCRIPTION

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Galvanized metal.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples: For each type of paint system and in each color and gloss of topcoat.

C. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Owner will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 32 sq. ft.
b. Other Items: Owner will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Owner at no added cost.

PART 2 - MATERIALS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product available products that may be incorporated into the Work include, but are not limited to, with Engineer’s approval, products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Architect from manufacturer's full range.

2.3 METAL PRIMERS

A. Primer, Steel Surfaces, phenolic Alkyd, Anti-Corrosive for Metal: MPI #79.

1. Primer, high solids, low VOC, heavy metal free, phenolic Alkyd, Anti-Corrosive for Metal: MPI #79, and certified in writing by topcoat manufacturer to be compatible with intermediate and topcoat.

a. Basis of Design: Kem Bond HS, Universal Metal Primer, Sherwin Williams.

B. Primer, Galvanized Steel Surfaces, phenolic Alkyd, Anti-Corrosive for galvanized Metal: MPI #79:

1. Primer, high solids, low VOC, heavy metal free, phenolic Alkyd, Anti-Corrosive for Metal: MPI #79, and certified in writing by topcoat manufacturer to be compatible with; galvanized steel, intermediate and topcoat.

a. Basis of Design: Kem Bond HS, Universal Metal Primer, Sherwin Williams.

2.4 SOLVENT-BASED PAINTS

A. Alkyd, Gloss (Gloss Level 6): MPI #48.

1. High solids, low VOC, alkyd, gloss: MPI #48, and certified in writing by manufacturer to be compatible with primer coat.

a. Basis of Design: Industrial Enamel HS, Sherwin Williams.

PART 3 - CONSTRUCTION METHODS

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and primer and paint systems indicated for surface preparation.

B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Engineer, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Steel Substrates: Applied to hollow metal doors and frames, and steel surfaces unless otherwise noted by other sections.

1. Coating System:

a. Prime Coat: Primer, phenolic alkyd, anti-corrosive for metal, MPI #79.
   1) 1-coat at minimum dry film thickness of 5.0 mils/coat.
b. Intermediate Coat: High Solids, alkyd, Industrial Enamel HS, matching topcoat, gloss level 6.
   1) 1-coat at minimum dry film thickness of 4.0 mils/coat.
c. Topcoat: High Solids, alkyd, Industrial Enamel HS, gloss level 6.

1) 1-coat at minimum dry film thickness of 4.0 mils/coat.

B. Galvanized-Metal Substrates: Applied to hollow metal doors and frames, steel surfaces unless otherwise noted by other sections.

1. Coating System:
   a. Prime Coat: Primer, phenolic alkyd, anti-corrosive for metal, MPI #79.
      1) 1-coat at minimum dry film thickness of 5.0 mils/coat.
   b. Intermediate Coat: High Solids, alkyd, Industrial Enamel HS, matching topcoat, gloss level 6, MPI #48.
      1) 1-coat at minimum dry film thickness of 4.0 mils/coat.
   c. Topcoat: High Solids, alkyd, Industrial Enamel HS, gloss level 6, MPI #48.
      1) 1-coat at minimum dry film thickness of 4.0 mils/coat.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

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SECTION 099600

HIGH-PERFORMANCE COATINGS

PART 1 - DESCRIPTION

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 surface preparation and the application of high-performance coating systems on the following substrates:

1. Interior Substrates:

a. Coating on Concrete, vertical and horizontal surfaces.
b. Fabric Covered Steel Frame Salt Barn Building Systems as indicated.

B. Related Requirements:

1. Section 133420 "Fabric Covered Steel Frame Salt Barn Building Systems" for coatings on steel surfaces.

2. Section 03300 “Cast-In-Place Concrete” for finish of concrete surfaces with high-performance coating is applied.

1.3 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

C. Product Information Data Sheets: Indicated Product description, product characteristics, surface preparations, application conditions, and material safety data sheets.

D. Application Bulletin: Indicate surface preparation, application conditions, application equipment, application procedures, clean-up instructions, and application instructions.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products:
1. Targuard low VOC coal tar epoxy, high build, two part, polyamide epoxy coal tar coating, as by Sherwin Williams, or approved equal.
a. Color: Black

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

2.3 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Engage will engage the services of a qualified testing agency to sample coating materials. Samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent, or a 28-day cure at 75 degrees F, whichever is more stringent.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

1. Clean surfaces with pressurized water. Use pressure range of 1500 to 2500 psi at 6 to 12 inches.

2. Refer to International Concrete Repair Institute (ICRI) No. 310.2R, Provide a Concrete Surface Profile (CSP) 1-3 for application of the coating. Surface shall be clean, dry, sound, and offer sufficient profile to achieve adequate adhesion. Minimum substrate cure shall be 28-days at 75 degrees F. Remove all form release agents, curing compounds, salts, efflorescence, laitance, and other foreign matter by sandblasting, shot-blasting, mechanical scarification, or suitable chemical means, Refer to ASTM D 4260. Rinse thoroughly to achieve a final pH between 8.0 and 10.0. Allow to dry thoroughly prior to coating.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-SP1 for touching up shop-primed surfaces.

1. Remove all oil, and grease from surfaces by solvent cleaning per SSPC-SP1 to a surface profile of 2 mils.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual.", Structural Steel Painting Council, SSPC,

1. Use applicators and techniques suited for coating and substrate indicated.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, roughness, or other surface imperfections. Produce sharp glass lines and color breaks.
   1. Apply two coats with each coat achieving a Dry Film Thickness per coat (DFT/ct.) of 10-mils.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

   1. Contractor shall touch up and restore coated surfaces damaged by testing.
   2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Wall and Pier Surfaces as indicated on drawings:

   1. Two coats of Targuard LOW VOC Coal Tar Epoxy as by Sherwin Williams or approved equal.

      a. Prime Coat: Dry mills 10.0.
      b. Topcoat: Dry mills 10.0.

B. Steel Substrates: Two coats of Targuard LOW VOC Coal Tar Epoxy as by Sherwin Williams or approved equal.

1. Exposed anchor bolts, base plate, and along the exposed surfaces of the steel frame structure for a height of two-feet above the base plate.

a. Prime Coat: Dry mills 10.0.
b. Topcoat: Dry mills 10.0.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Cost includes all labor, material, services, and equipment necessary to complete the work in every aspect.

END OF SECTION

SECTION 133420

FABRIC COVERED STEEL FRAME SALT BARN BUILDING SYSTEMS

PART 1 - DESCRIPTION

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.

B. Related Requirements:
1. Section 033000 "Cast-in-Place Concrete." For installation of anchorages, and coordination of anchorages.
2. Section 014000 “Quality Requirements” For Engineers Qualifications, testing, and quality requirements.
3. 099113 “Exterior Painting”, for coating requirements of motorized overhead doors.

C. Design Codes and Standards:

1. ASCE/SEI 7-10 “Minimum Design Loads for Buildings and Other Structures.”
2. 2012 International Building Code (IBC).
3. ASCE Standard 17-96, Air Supported Structures.
4. ASCE Standard 19-10, Structural Applications of Steel Cables for Buildings.
5. ASCE Standard 55-10, Tensile Membrane Structures.
6. ASCE 2013 “Tensile Fabric Structures, Design, Analysis, and Construction.”
7. American Concrete Institute (ACI).
8. American Institute of Steel Construction (AISC).
9. American Iron and Steel Institute (AISC).

1.2 SUMMARY:

A. This project consists of providing all engineering, coordination, materials, labor, and equipment necessary to design, engineer, fabricate, supply, anchor, and install a fabric covered steel frame system with a tensioned fabric membrane cover to be supported by a new foundation system designed for the reactions of the fabric covered steel frame system and all else necessary to provide the project complete. An outline summary of the structure for the fabric covered steel frame system is as follows:

B. The structure shall be a fabric covered steel frame system with a tensioned fabric membrane cover with motorized overhead doors at each end of the structure. The fabric membrane cover shall have low elongation characteristics under tension.

C. The structure shall be supported by a foundation system design for the reactions of the fabric covered steel frame system.

1. The steel frame system be placed on a new foundation, the placement of the new foundation system shall be included as part of the general contractor’s work.

D. The structure shall have weather-tight motorized doors on both ends providing access for all required vehicles.

E. The interior of the structure below the mainframes shall be clear span and free of any interior structural support members or columns and shall provide for unobstructed floor space.

1. No exterior purlins, guy-wires, ropes or cables shall be used for anchoring the structure.

F. Performance Requirements: The fabric covered steel frame system manufacturer shall be responsible for all the design, coordination, configuration, fabrication, and erection of the complete fabric covered steel frame system structure. All materials provided shall be new and unused.

1. Delegated Design: The structural design of the fabric covered steel frame and overhead motorized door is to be by the fabric covered steel frame system manufacturer's engaged qualified professional engineer to completely design the fabric covered steel frame system with a tensioned fabric membrane cover. Design for each structure shall meet the requirements of the applicable edition of the IBC and the minimum design loads indicated for the authority having jurisdiction. The contractor shall verify design loads with the local building official for the authority having jurisdiction prior to designing the structure. The fabric covered steel frame shall meet the performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction. Failure includes the following:
    a. Deflection exceeding specified limits.
    b. Stresses due to deflection transferring to supporting foundation structures.
    c. Thermal stresses transferring to supporting foundation structures.
    d. Framing members transferring stresses, including those caused by thermal and structural movements to foundation structures.
    e. Noise or vibration created by wind, rain, and by thermal and structural movements.
    f. Loosening or weakening of fasteners, attachments, and other components.
    g. Sealant failure.
    h. Failure to meet performance requirements as specified within this Specification.
2. The fabric covered steel frame system shall withstand the effects of the "Design Codes and Standards" imposed vertical and lateral loads. Deflections and stresses are to be within limits and under conditions indicated according to and in the "Design Codes and Standards."
3. The fabric covered steel frame systems engineer shall provide the frame support reactions to the Engineer and Owner, prior to the submittal of the reinforcing steel shop drawings for the verification of the design of the concrete foundation system, in a timely manner so as not to delay the work.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, transfer of stresses to anchors and foundations, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
5. The design of the anchor bolts for the steel frame is delegated to the salt-barn manufacturer. Delegated is the design of number, type, size, length, embedment and

hook of the anchor bolts and all else as required for this item. Post installed anchors are not permitted.

a. Provide setting setting drawings indicating elevations, locations, and dimensions for anchorage devices and other embedded items required for adjoining work, for review, that is attached to or supported by cast-in-place concrete.

6. A representative of the fabric covered steel framed slat barn building systems manufacturer shall be on site to supervise the placement of their cast-in anchor bolts.

G. A complete fabric covered structure shall be provided including anchorages to provide for long-term storage of salt.

H. The fabric covered steel frame system manufacturer's qualified professional engineer registered in the State of Delaware shall provide signed and sealed documents for the comprehensive structural analysis and design calculations, fabrication and erection drawings, and supporting data indicating compliance with the performance requirements.

I. Section Includes:

1. Delegated Design Requirements.
2. Structural-steel framing.
3. Fabric Membrane Materials.
4. Cables and Fittings.
5. Bolts and Related Fasteners.
6. Anchor Bolts.
7. Motorized Overhead doors and frames.
8. Accessories.

1.3 DEFINITIONS

A. Terminology Standard: See ASCE's "Tensile Fabric Structures, Design, Analysis, and Construction", for definitions of terms for fabric covered steel frame system with a tensioned fabric membrane cover not otherwise defined in this Section or in standards referenced by this Section.

1.4 COORDINATION

A. Coordinate sizes and locations of concrete foundations, walls, piers, and reinforcing with casting of anchor-bolts into concrete foundation walls, piers, and reinforcing. Anchor bolt installation, concrete, reinforcement, and formwork requirements are specified in Appendix Reference Specifications, Section 033000 "Cast-in-Place Concrete."

1. A representative of the fabric covered steel framed slat barn building systems manufacturer shall be on site to supervise the placement of their cast-in anchor bolts.

B. Coordinate fabric membrane assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

C. Deliver salt barn manufacturer’s anchor bolts to site for placement in cast in place concrete so as not to delay the work. Provide templates and anchorages as required to securely set anchor bolts.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at the Project site.

1. Review methods and procedures related to salt barn systems including, but not limited to, the following:

a. Condition of foundations and other preparatory work performed by other trades.
b. Structural load limitations.
c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
d. Required tests, inspections, and certifications.
e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.

2. Review methods and procedures related to fabric membrane roof and wall panel assemblies including, but not limited to, the following:

a. Compliance with requirements for purlin, rafter, mullions, and girt conditions, including flatness and attachment to structural members.
b. Structural limitations of purlins rafters, mullions, and girts during and after roofing and siding.
c. Flashings, special roof and wall details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect fabric membrane roof and wall system.
d. Temporary protection requirements for fabric membrane roof and wall system assembly during and after installation.
e. Roof and wall observation and repair after fabric membrane roof and wall system installation.

3. Review methods and procedures related to fabric membrane system assemblies including, but not limited to, the following:

a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
b. Structural limitations of frame members, rafters, girts, mullions and columns during and after fabric membrane system installation.
c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect fabric membrane system.
d. Temporary protection requirements for fabric membrane system assembly during and after installation.
e. Wall observation and repair after metal wall panel installation.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of salt barn system component.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

a. Fabric Membrane roof and wall system.
b. Steel Frame systems.
c. Connectors and anchors.
d. Motorized Overhead doors and frames.
e. Roof ventilators.
f. Louvers.
g. Coating Systems

2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: Provide signed and sealed shop drawings by qualified professional engineer registered in the State of Delaware. Shop drawings shall include comprehensive fabrication and erection drawings in the form of full building plans, elevations, sections, details, components supplied by others, items for coordination with other sections, and the following:

1. Anchor-Bolt Plans: Submit separate anchor-bolt plans and templates in a timely manner and before foundation work begins. Include: setting diagrams; dimensions and elevations; location; required anchor type, diameter, embedment length, and hook lengths; and minimum required projection of anchor rods required to attach fabric covered steel frame building to concrete pilasters and walls. Indicate column reactions at each location.

a. Post installed anchors for the main structural frame are not permitted.

2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

a. Show provisions for attaching doors, louvers, lighting tracks, and roof vents.

3. Fabric Membrane System Layout Drawings: Show layouts of fabric membrane sheets including methods of support. Include details of edge conditions, joints, membrane profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details required for complete fabrication, and installation. Distinguish between factory-and field-assembled work; show locations of fasteners.

a. Show roof-mounted items including penetrations, lighting fixtures, and items mounted on roof members.
b. Show wall-mounted items including personnel doors, louvers, and lighting fixtures.

4. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

a. Flashing and trim.

5. Overhead Motorized Door: Provide signed and sealed shop drawings by qualified professional engineer registered in the State of Delaware. Provide Comprehensive shop drawings. Show complete fabrication and erection drawings of overhead door, jambs, hoods, attachments, power, primary and secondary bracing and framing. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

C. Samples for Verification: For the following products:

1. Fabric Membrane: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: Nominal 12-inch long Samples for each type of accessory.
4. Coating Systems: Nominal 12 inches long by 6 inches wide. Include actual finish that will be applied to structure, overhead doors, and door frames.

D. Door Schedule: For Motorized Overhead doors and frames. Use same designations indicated on Shop Drawings. Include details of reinforcement.

1. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
2. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

E. Delegated-Design Submittal: For tensioned fabric covered steel frame building systems, and motorized overhead door.

1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer registered in the State of Delaware responsible for their preparation.
2. Include complete and comprehensive design and coordination of the fabric covered steel frame system, and overhead motorized door according to the applicable “Design Codes and Standards” and all else necessary to provide the structure, including comprehensive structural analysis and design calculations, fabrication and erection drawings, supporting data, indicating compliance with the performance requirements.

F. Professional Engineered Signed and Sealed Calculations:

1. The fabric covered steel frame system manufacturer’s qualified professional engineer registered in the State of Delaware shall provide signed and sealed calculations for the comprehensive structural analysis and design of the tension fabric membrane, structural frame, purlins, tension cables or tension rods, end wall frames, overhead motorized door, and all systems necessary for the structural design of the tension fabric membrane frame structure.
    a. Calculations shall include final critical reactionary forces to be used in the design of the supporting and wall support system.

b. Calculations shall include the design of the embedded anchor system, indicating type, size, length, embedment, hook, and setting dimensions of the anchors.
c. Post installed anchors for the main structural frame are not permitted.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For erector, manufacturer, and surveyor.

B. Welding certificates.

C. Letter of Design Certification: Signed and sealed by the qualified professional engineer. Include the following:

1. Name and location of Project.
2. Order number.
3. Name of manufacturer.
4. Name of Contractor.
5. Building dimensions including width, length, height, and roof slope.
6. Indicate compliance with IBC, ASCE, AISC, and AISI, including edition dates of each standard.
7. Governing building code and year of edition.
8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, rain, wind loads/speeds and exposure, temperature, seismic design category or effective peak velocity-related acceleration/peak acceleration.
9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
10. Building-Use Category: Indicate category of building use and its effect on load importance factors.

D. Erector Certificates: For qualified erector, from manufacturer.

E. Material Test Reports: For each of the following products:

1. Structural steel including chemical and physical properties.
2. Stainless steel, and aluminum steel including chemical and physical properties.
3. Bolts, nuts, and washers including mechanical properties and chemical analysis.
4. Tension-control, high-strength, bolt-nut-washer assemblies.
5. Shop primers.
6. Nonshrink grout.

F. Source quality-control reports.

G. Field quality-control reports.

H. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

I. Sample Warranties: For special warranties.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fabric membrane finishes and door hardware to include in maintenance manuals.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

1. Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."
3. AWS D1.2, “Structural Welding Code – Aluminum.”

D. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, fabric membranes, steel, aluminum, frame members, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package fabric membranes, and other products as required for protection during transportation and handling.

B. Unload, store, and erect fabric membranes in a manner to prevent bending, tearing, puncturing, warping, twisting, and surface damage.

C. Stack materials horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store materials subject to water damage to ensure dryness, with positive slope for drainage of water. Do not store materials in contact with other materials that might cause staining, denting, or other surface damage.

1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with fabric membrane installation only when weather conditions permit fabric membrane to be installed according to manufacturers' written instructions and warranty requirements.

1.12 WARRANTY

A. Warranty on fabric membrane: Manufacturer agrees to repair or replace fabric membrane that show evidence of tearing, failure at lap joints, failure of seals, failure of connections, or manufacturing or installation defects for a period of 20 years from substantial completion.

B. Special Warranty on fabric membrane Finishes: Manufacturer agrees to repair finish or replace fabric membrane that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed fabric membrane Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, tearing, checking, peeling.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weather-tightness Warranty for fabric membrane cover: Manufacturer agrees to repair or replace fabric membrane assemblies that leak or otherwise fail to remain weathertight within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

D. Warranty on Frame and Structure: Manufacturer agrees to repair or replace frame and structure that shows evidence of excessive deflection, failure at connections, failure of seals, or manufacturing or installation defects for a period of 50 years from substantial completion.

E. Warranty on Coatings: Manufacturer agrees to repair or replace coatings, remove corrosion, and repair or replace items items that shows evidence of coating failure by excessive corrosion, or manufacturing or installation defects for a period of 20 years from substantial completion.

PART 2 - MATERIALS

2.1 MANUFACTURERS

A. Source Limitations: Obtain frame salt barn system components, including primary and secondary framing and membrane fabric, accessories and assemblies, from single source from single manufacturers. Available manufacturer's include but are not limited to:

1. Clear Span Fabric Structures
1395 John Fitch Blvd,
South Windsor, CT 06074
(800) 603-4445

2. Legacy Building Solutions: Clear Span Fabric Structures
19500 Country Road 142
South Haven, MN 55382
(320) 259-0087

2.2 SYSTEM DESCRIPTION

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal frame building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

B. Primary-Frame Type: Primary-Frame Type maybe either of the following:

1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.
2. Truss-Frame Clear Span: Truss-member, structural-framing system without interior columns.

C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of load-bearing end-wall and corner columns and rafters.

D. Secondary-Frame Type: Manufacturer's standard purlins and joists and flush-framed girts.

E. Eave Height: building profile as indicated on drawings.

F. Bay Frame Spacing: As indicated on Drawings.

G. Roof Slope: As indicated on the drawings.

H. Roof and Exterior Wall Cladding Membrane: The structure shall be clad with a flame-retardant vinyl membrane manufactured by an approved and reputable supplier with demonstrated long-term performance. The membrane fabric shall be waterproof and free from defects.

1. All roofs, walls, end walls and connecting sections of the cladding shall be weather tight. The material color shall be selected by the Owner from the manufacturer's standard colors for the sidewalls and roof panels. The material scrim and coating shall be UV stabilized and shall carry a minimum 10-year manufacturer's warranty. Minimum fabric specification requirements are as follows:

a. Minimum Base Fabric Weight:	7.84 oz./yd^2
b. Minimum Total Finished Fabric Weight:	28 oz/yd^2.
c. Grab Tensile Strength:	650 x 500 lbs. (ASTM D5100).
d. Tongue Tear Strength:	120 x 100 lbs. (ASTM D5134).
e. Trapezoidal Tear:	100 x 80 lbs. (ASTM D5136).
f. Cold Crack Resistance:	-45 ºC (ASTM D2136) No Cracking or flaking.
g. Fire Retardant:	Meeting NFPA 701-2010 Test Method 1 and 2.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design steel frame building system, and overhead motorized door.

B. Structural Performance: The fabric covered steel frame system, and motorized overhead doors shall withstand the effects of the “Design Codes and Standards” imposed vertical and lateral loads. Deflections and stresses are to be within limits and under conditions indicated according to and in the “Design Codes and Standards” identified and listed as values and factors as required by IBC 1603.

1. Minimum Design Loads: As indicated on the Drawings, and as required by delegated design engineer.
2. Deflection and Drift Limits: Design salt barn system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
3. Deflection and Drift Limits: No greater than the following:

    a. Purlins and Rafters: Vertical deflection of 1/240 of the span.
    b. Girts: Horizontal deflection of 1/240 of the span.
    c. Fabric membrane cover: Vertical deflection of 1/240 of the span.
    d. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.

4. The maximum allowable deflection of any structural member shall be L/240 and the maximum story lateral drift shall be H/50 for seismic, and H/400 for wind. (H is the height).
5. Do not allow stresses from deflections to transfer into supporting concrete walls or foundations.

C. Seismic Performance: Steel Frame building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Do not allow thermal stress to transfer to supporting concrete walls or foundations. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: from -20 deg F to + 120 deg F, ambient.

E. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide fabric membrane assemblies identical to those of assemblies tested for fire resistance per ASTM E E84 or ASTM E 108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory," FM Global's "Approval Guide," or from the listings of another qualified testing agency.

F. Fire Propagation Characteristics: Exterior wall assemblies containing foam plastics pass NFPA 701 fire test.

G. Structural Performance for fabric membrane roof and walls: Provide fabric membrane systems capable of withstanding the effects of the following loads, based on testing according to ASTM E E84:

1. Wind Loads: As indicated on Drawings.
2. Snow Loads: As indicated on Drawings.
3. Collateral Load: As indicated on Drawings
4. Rain and other loads: As required by delegated design engineer.

H. Water Penetration for fabric membrane roof and walls: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

I. Water Penetration for fabric membrane walls: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

J. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

K. FM Global Listing: Provide fabric membrane cover and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-120.
2. Hail Resistance: SH.

L. The fabric covered steel frame system manufacturer’s qualified professional engineer registered in the State of Delaware shall provide signed and sealed documents for the comprehensive structural analysis and design calculations, fabrication and erection drawings, and supporting data indicating compliance with the performance requirements.

2.4 STRUCTURAL-STEEL FRAMING

A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."

B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.

a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Engineer.

2. Rigid clear-span frames: I-shaped or tube frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
3. Truss-frame, clear-span frames: Rafter frames fabricated from I-shaped column sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
4. Truss-Frame Modular Frames: Rafter frames fabricated from joist girders, and I-shaped column sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
5. Frame Configuration: Single gable.
6. Exterior Column: Tapered.
7. Rafter: Uniform depth.

E. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:

1. End-Wall and Corner Columns: I-shaped, pipe or tube sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.

F. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, pre-painted with coil coating, to comply with the following:

1. Purlins: Structural sections; fabricated from built-up steel plates, steel sheet, or structural steel, or shapes as required to comply with system performance requirements.

a. Depth: As required to comply with system performance requirements.

2. Girts: Structural sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes.

b. Depth: As required to comply with system performance requirements.

2. Eave Struts: Structural sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for fabric membrane.
3. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch- diameter, cold-formed structural tubing to stiffen primary-frame flanges.
4. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
5. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, fabricated from zinc-coated (galvanized) steel sheet.
6. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.

7. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
8. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

G. Bracing: Provide adjustable wind bracing using any method as follows:

1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch- diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
2. Cable: ASTM A 475, minimum 1/4-inch-diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
5. Pined-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.

H. Anchor Bolts: Headed or hooked cast-in anchor bolts as required by manufacturer’s design as indicated on Approved Anchor Bolt Plan for attachment of salt barn building to foundation.

I. Materials:

1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
7. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

    a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.
    b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, SS, Grade 50 or 80 with Class AZ50 (AZM150) coating.

9. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.

    a. Finish: Hot-dip zinc coating, ASTM F 2329, Class C.

10. Structural Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

    a. Finish: Hot-dip zinc coating, ASTM F 2329, Class C.

11. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.
12. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with spline ends.

    a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

13. Unheaded Anchor Rods: ASTM F 1554, Minimum Grade 36.

    a. Configuration: Straight.
    b. Nuts: ASTM A 563 heavy-hex carbon steel.
    c. Plate Washers: ASTM A 36/A 36M carbon steel.
    d. Washers: ASTM F 436 hardened carbon steel.
    e. Finish: Hot-dip zinc coating, ASTM F 2329, Class C.

14. Headed Anchor Rods: ASTM F 1554, Minimum Grade 36.

    a. Configuration: Hooked.
    b. Nuts: ASTM A 563 heavy-hex carbon steel.
    c. Plate Washers: ASTM A 36/A 36M carbon steel.
    d. Washers: ASTM F 436 hardened carbon steel.
    e. Finish: Hot-dip zinc coating, ASTM F 2329, Class C.

15. Threaded Rods: Minimum ASTM A 36/A 36M.

    a. Nuts: ASTM A 563 heavy-hex carbon steel.
    b. Washers: ASTM F 436 hardened carbon steel.
    c. Finish: Hot-dip zinc coating, ASTM F 2329, Class C.

J. Finish: Manufacturer's factory primed and finished with manufacturer's zinc rich corrosion protection coatings. All steel components shall be primed and finished coated with a gloss finish to provide a minimum corrosion resistance of 1800 hours in accordance with ASTM B117, Standard Practice for Operating Salt Spray (Fog) Apparatus. Apply primer immediately after cleaning and pretreating.

    1. As a minimum, clean and prepare surfaces in accordance with SSPC-SP6, or as required by coating manufacturer.

2. Coat with manufacturer's standard primer compatible with top coat. Apply primer and top coats to primary and secondary framing to a minimum dry film thickness of 5 mils or as recommended by coating manufacturer to achieve corrosion resistance.

    a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 5 mils on each side, or as recommended by coating manufacturer to achieve corrosion resistance.

K. Coatings: Zinc rich conforming to ASTM B6, Standard Specifications for Zinc, High Grade (1.1.3.) and Special High Grade (1.1.2). Unless otherwise noted.

1. Exterior: In-line galvanized to a minimum normal coating zinc weight of 0.9 oz/ft². Chromate conversion coating applied over the galvanized surface to provide additional corrosion protection. Clear organic polymer applied as the top surface coat to retard oxidation, enhance surface appearance and provide a primer for subsequent coatings.

2. Interior: Full zinc based galvanized organic coating applied to 100% of the interior surfaces as a corrosion barrier.

2.5 TENSION FABRIC MEMBRANE COVER

A. Tension fabric membrane cover: Formed with a flame-retardant vinyl membrane with dimensional stability and with sufficient tensile strength to resist imposed stresses. Fabric is to be designed for installation and service without tearing or puncturing.

1. Material: As Indicated by system description.

    a. Loosely woven scrims will not be permitted.
    b. Color: As selected by Owner from manufacturer's full range.

2. Clamps: Bar type, with stud threaded to support member, continuous fabric flashing and blocked.
3. Joint Type: Field Spliced, with stainless steel connectors and connection plates, base clamps, neoprene caps, and continuous seal strips.
4. Thickness: As required for structural performance.

2.6 ALUMINUM MEMBRANE PLATES AND CLAMPS

A. Aluminum shall conform to alloy 6061-T6.

B. All components will be welded or stamped with appropriate part number in a manner that will still be visible after powder coating is applied.

C. The aluminum shall be polyester powder painted to a minimum of 3 mils.

D. Do not allow aluminum to come in contact with concrete or steel surfaces.

2.7 CABLES AND FITTINGS

A. Galvanized Cables and Fittings:

1. All structural wire rope shall be made from Wire Rope conforming to AISI Steel Cable Manual requirements with a Class A galvanized coating or approved substitute.
2. Wire rope shall be improved plow steel 6 x 19 IWRC.
3. All cable terminations and connectors shall be hot-dipped galvanized for corrosion protection.
4. Cables shall be designated with a minimum safety factor of 2 on breaking strength.
5. Cables with are designated to be pre-stretched shall be pre-stretched per ASTM A603 for wire rope. Cables of the same type shall have the same modulus of elasticity.
6. All cables and end fittings shall be delivered clean and dry.
7. All swaged and speltered fittings shall be designated and attached to develop the full breaking strength of the cable. Thimble end fittings shall develop a minimum of 110% of the cable breaking strength.
8. Swaged end fittings, pins, nuts and washers shall be electro-galvanized.
9. Speltered end fittings shall be hot-dipped galvanized.
10. Attach a tag indicating the cable length and mark number to each cable assembly.
11. Cables shall be tensioned to double the manufacturer's required load before length is cut.
12. Cables shall be tensioned to the manufacturer's required load when measuring the cut length that is indicated on the shop drawings.

B. Stainless Steel Cables and Fittings:

1. Cables shall be 1 x 19 Stainless Steel Open Strands, Grade 316
2. Attach a tag indicating the cable length and mark number to each cable assembly.
3. Cables shall be tensioned to double the manufacturer's required load before length is cut.
4. Cables shall be tensioned to the manufacturer's required load when measuring the cut length that is indicated on the shop drawings.

2.8 SOFFITS

A. General: Provide factory-formed soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Soffit Panels: Match profile and material of metal roof and wall systems.

1. Finish: Match finish and color of metal roof and wall systems.

2.9 MOTORIZED OVERHEAD DOORS AND FRAMES

Coiling Door: Included with the Salt Barn, provide and install two motorized, corrosion resistant, overhead rolling service doors, complete in place of the size as indicated on the drawings and as follows:

A. Available Manufacturer's include but are not limited to: Cornell, Wayne Dalton and CHI or approved equal.
    1. Operation: Motorized Electric.
    2. Between Jamb Mounting and fastened between the jambs of the wall opening with guide attachment and hardware as required for complete support and installation.
    3. Material: The curtain shall consist of interlocking steel slats roll-formed from commercial quality hot-dipped galvanized (G-90) steel per ASTM A-653 to resist corrosion. Steel gauge thickness shall be minimum steel thickness as required to resist design loads and for performance, but not less than 20 gauge steel.
    4. Slat Type: Flat Slat.
    5. Components, hardware: hot-dipped galvanized (G-90) steel per ASTM A-653, or corrosion resistant materials as approved.
    6. Finish: Factory-apply corrosion resistant primer immediately after cleaning and pretreating of materials. Prepare surfaces and apply in accordance with manufactures recommendations.
        a. Shop Primer: Primer, Zinc-Rich, Polyamide, Epoxy primer complying with MPI #20 and complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure, as Sherwin-Williams Zinc Clad IV, or approved equal.
        b. Intermediate coat: Factory or field applied, Polyamide Epoxy, High Solids, High-Build, Low gloss, MPI #108, and complying with SDI A250.3 for performance and acceptance criteria, as Sherwin-Williams Macropoxy 646-100 Fast Cure Epoxy, or approved equal.
        c. Top Coat: Factory or field applied, Polyamide Epoxy, High Solids, High-Build, low gloss, MPI #108, as Sherwin-Williams Macropoxy 646-100 Fast Cure Epoxy, or approved equal.
        d. Color: As indicated by manufacturer's designations and as selected by owner from full range of samples.
    7. Wind Load: As indicated on the drawings.
    8. Provide and install, coated for corrosion resistant, endlocks, bars and seats, guides, jambs, weather seals, counterbalance system, enclosures, and hardware, as required for a complete installation.

B. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

    1. Comply with NFPA 70.
    2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

C. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
2. Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.

D. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.10 ACCESSORIES (By manufacturer's designations).

A. General: Provide accessories as standard with salt barn system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Fabric Membrane Roof Accessories: Provide components required for a complete Fabric Membrane roof panel assembly including gaskets, connectors, caps, splices, rope lacings, seals and heat seals, closure strips, and similar items. Match material and finish of fabric membrane cover unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as fabric membrane cover.
2. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.
3. Clamps: Manufacturer's standard, mechanically seamed clamps formed from stainless-steel sheet or nylon-coated aluminum sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or pre-molded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Wall Accessories: Provide components required for a complete fabric membrane wall sheet assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
2. Clamps: Manufacturer's standard, mechanically seamed clamps formed from stainless-steel sheet or nylon-coated aluminum sheet.

3. Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.
4. Backing Plates: Provide metal backing plates at sheet end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or pre-molded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, pre-painted with coil coating; finished to match adjacent fabric membranes.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.030 nominal uncoated steel thickness, pre-painted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, pre-painted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

1. Gutter Supports: Fabricated from same material and finish as gutters.
2. Strainers: aluminum wire ball type at outlets.

F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch (0.46-mm) nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot-long sections, complete with formed elbows and offsets.

1. Mounting Straps: Fabricated from same material and finish as gutters.

G. Louvers: Size and designed by salt barn building manufacturer, self-framing and self-flashing. Fabricate welded frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048-inch nominal uncoated steel thickness; finished to match metal wall panels. Form blades from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.036-inch nominal uncoated steel thickness; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance.

1. Blades: Fixed.
2. Free Area: Not less than 7.0 sq. ft. for 48-inch- wide by 48-inch- high louver.
3. Bird Screening: Galvanized steel, 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire; with re-wireable frames, removable and secured with clips; fabricated of same kind and form of metal and with same finish as louvers.

    a. Mounting: Exterior face of louvers.

4. Vertical Mullions: Provide mullions at spacings recommended by manufacturer, or at a maximum of 72 inches o.c., whichever is less.

H. Materials:

1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.

    a. Fasteners for Fabric membrane cover: Self-tapping, Type 410 stainless steel or self-tapping, Type 316 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of fabric membranes.
    b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
    c. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

2. Corrosion-Resistant Coating: Cold-applied coal tar epoxy, compounded for 8-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities as identified.
3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
4. Fabric membrane Sealants:

    a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
    b. Joint Sealant: ASTM C 920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in fabric membranes and remain weathertight; and as recommended by salt barn system manufacturer.

2.11 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with ASCE/SEI “Tensile Fabric Structures Design, Analysis, and Construction” for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

1. Make shop connections by welding or by using high-strength bolts.
2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 6. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

1. Make shop connections by welding or by using non-high-strength bolts.
2. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 6. Shop prime secondary framing with specified primer after fabrication.

E. Fabric membranes: Fabricate and finish fabric membranes at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of fabric membrane.

2.12 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections, source quality control inspections and to submit reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1, AWS D1.2, and the following inspection procedures:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Visual Inspections

D. Prepare test and inspection reports.

1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.

    a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

2.14 ADDITIONAL MATERIALS

A. 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 IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

B. Grout: High performance, non-shrink, non-metallic, cementitious grout, non-chloride containing 2-stage, non-segregating meeting Corps of Engineers Specification CRD C-621 and ASTM C-1107 (Grade C) with a minimum 28 day compressive strength of 5,000 psi and a minimum bond strength at 28-days of 2,000 psi according to ASTM C-882

1. Grout shall be extended with pea gravel aggregate, in accordance with the manufactures instructions. Aggregate shall be non-reactive, clean, well-graded, saturated surface dry, have low absorption and high density, with a recommended maximum size of number 8 per ASTM C33 Table 2.

PART 3 - CONSTRUCTION METHODS

3.1 COORDINATION

A. Provide anchors, and setting templates as indicated on the approved anchor bolt setting drawings and shop drawings for embedment in concrete in a timely manner so as not to delay construction.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Before erection proceeds, survey elevations, dimensions, and locations of concrete- and bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and salt barn building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

D. Proceed with erection only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Clean and prepare surfaces for new work and work to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

C. Clean keyways and adjacent surfaces to receive grout. Remove insulation, chips, wood, sawdust, dirt, and other debris just before placing grout.

A. Anchors: Place and secure anchorage devices and other embedded items required for adjoining work that is cast into keyway. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchors, accurately located, to elevations required and in conformance with tolerances to accept adjoining work.

B. Grout: Contact grout manufacturer for place grout in accordance with manufacturer’s instructions. Wet cure for a minimum of 3-days or apply a curing compound with complies with ASTM C-309 on exposed surfaces.

3.4 ERECTION OF STRUCTURAL FRAMING

A. Erect salt barn frame system according to manufacturer's written instructions and drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal frame building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.

a. Joint Type: Snug tightened or pre-tensioned as required by manufacturer.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors and windows.
3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof and sidewalls where indicated on approved shop and erection erection drawings.

1. Tighten rod and cable bracing to avoid sag.
2. Locate end-bay bracing only where indicated.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Outside lighting, wall packs and floodlights should be LED fixtures. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.5 FABRIC MEMBRANE ROOF AND WALL INSTALLATION, GENERAL

A. Fabricate and finish fabric membrane system and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Examination: Examine primary and secondary framing to verify that structural support members and anchorages have been installed within alignment tolerances required by manufacturer.

1. Examine roughing-in for components and systems penetrating fabric membranes, to verify actual locations of penetrations relative to seams before fabric membrane installation.

C. General: Anchor fabric membrane and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cut fabric membranes as required for doors, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent fabric membrane finishes.

    a. Field cutting of fabric membranes by torch is not permitted.

2. Install fabric membranes perpendicular to structural supports unless otherwise indicated.
3. Flash and seal fabric membrane with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate fabric membrane splices over structural supports with end laps in alignment.
6. Lap metal flashing over fabric membranes to allow moisture to run over and off the material.

D. Lap-Seam fabric membrane: Install stainless steel bolts with clamps, and continuous neoprene watertight cover. Control torque adjusted to compress EPDM washers tightly without damage to washers, bolt threads, or gaskets. Install bolts in predrilled holes.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Apply neoprene seals and associated items for neat and weathertight enclosure. Avoid "seal creep" or application not true to line.

E. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

F. Joint Sealers: Install neoprene gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of fabric membrane assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by fabric membrane manufacturer.

3.6 FABRIC MEMBRANE ROOF INSTALLATION

A. General: Provide fabric membrane cover of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

1. Install ridge splices fabric membrane roof work proceeds.
2. Flash and weather tight seal fabric membrane cover with weather closures at eaves and rakes. Fasten with stainless steel bolts, clamps, gaskets, and covers.

B. Fabric Membrane cover: Fasten fabric membrane cover to supports with concealed clips at each field splice, at location and spacing and with fasteners recommended by manufacturer.

1. Install clips to supports with self-drilling or self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
4. Seamed Joint: lap seams with manufacturer-approved detail.
5. Rigidly fasten eave end of fabric membrane cover and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
6. Provide closures at lapping sheets, ends, or otherwise terminating locations.

C. Lap-Seam Fabric membrane cover: Fasten fabric membrane cover to supports with exposed fasteners at each lapped joint, at location and spacing recommended by manufacturer.

1. Provide metal-backed sealing washers under heads of exposed fasteners bearing on weather side of fabric membrane cover.
2. Provide sealant tape at lapped joints of fabric membrane cover and between panels and protruding equipment, vents, and accessories.
3. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps and on side laps of nesting-type fabric membranes, on side laps of ribbed or fluted fabric membranes, and elsewhere as needed to make fabric membranes weatherproof to driving rains.
4. At fabric membrane splices, nest panels with minimum 6-inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

D. Fascia Sheets: Align bottom of fabric membranes and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal fabric membranes with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

E. Fabric Membrane Installation Tolerances: Shim and align fabric membrane cover within installed tolerance of 1/4 inch in 20 feet on slope and location lines and within 1/8-inch offset of adjoining faces and of alignment of matching and or adjacent sheets.

3.7 FABRIC MEMBRANE WALL INSTALLATION

A. General: Install fabric membrane wall in orientation, sizes, and locations indicated on Shop Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor fabric membrane walls and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Unless otherwise indicated, begin fabric membrane panel installation at corners with center of sheet lined up with line of framing.
2. Shim or otherwise plumb substrates receiving fabric membrane walls.
3. When two rows of fabric membrane sheets are required, lap sheets per manufactures approved details and recommendations.
4. When building height requires two rows of fabric membrane sheets at gable ends, lap gable sheets over wall sheets at eave height.
5. Securely fasten base end of fabric membrane wall sheets and allow eave end free movement for thermal expansion and contraction.
6. Flash and seal membrane fabric sheets wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping connectors, clams, flashings, and gaskets.
7. Install connector fasteners in predrilled holes.
8. Install flashing and trim as fabric membrane wall sheet work proceeds.

9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, as necessary for waterproofing.
10. Align bottom of fabric membrane wall sheets and fasten with blind connectors, bolts, or self-tapping connectors.
11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Fabric Membrane Wall Sheets: Install metal wall panels on exterior side of girts. Attach fabric membrane wall sheets to supports with fasteners as recommended by manufacturer.

C. Installation Tolerances: Shim and align fabric membrane wall sheets within installed tolerance of 1/4 inch in 20 feet, noncumulative; level, plumb, and on location lines; and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 FABRIC MEMBRANE SOFFIT PANEL INSTALLATION

A. Provide fabric membrane soffit sheets the full width of soffits. Install fabric membrane sheets perpendicular to support framing.

B. Flash and seal fabric membrane soffit sheets with weather closures where sheets meet walls and at perimeter of all openings.

3.9 DOOR AND FRAME INSTALLATION

A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.

B. Door Hardware:

1. Install surface-mounted items after finishes have been completed at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
4. Set thresholds for exterior doors in full bed of sealant complying with requirements for concealed mastics specified in Section 079200 "Joint Sealants."

C. Install motorized overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

D. Install motorized overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.

E. Accessibility: Install motorized overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

F. Power-Operated Doors: Install according to UL 325.

3.10 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete fabric membrane roof assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete fabric membrane wall assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Mount ventilators on flat level base. Install preformed filler strips at base to seal ventilator to fabric membrane cover.

D. Louvers: Locate and place louver unit’s level, plumb, and at indicated alignment with adjacent work.

1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.11 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform field quality control special inspections and to submit reports and perform the following inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedure.

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.

E. Product will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.12 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

C. Windows: Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and at weather stripping to ensure smooth operation and weathertight closure. Lubricate hardware and moving parts.

D. Roof Ventilators and Adjustable Louvers: After completing installation, including work by other trades, lubricate, test, and adjust units to operate easily, free of warp, twist, or distortion as needed to provide fully functioning units.

1. Adjust louver blades to be weathertight when in closed position.

3.13 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

1. Clean and prepare surfaces by SSPC-SP 3, "Power Tool Cleaning."
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

D. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

E. Fabric membranes: Remove temporary protective coverings and strippable films, if any, as fabric membranes are installed. On completion of fabric membrane installation, clean finished surfaces as recommended by fabric membrane manufacturer. Maintain in a clean condition during construction.

1. Replace fabric membranes that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

F. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.

1. Immediately before final inspection, remove protective wrappings from doors and frames.

G. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

APPENDIX

Reference Specifications

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SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - DESCRIPTION

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.

B. Related Requirements:
1. Section 133420 “Fabric Covered Steel Frame Salt Barn Buildings Systems” for coordination of anchors to be cast in concrete for the building frame and overhead door, confirmation of reactions, and including coordination of Fabric Covered Steel Framed Salt Barn Building Systems.
2. Section 09960 “High Performance Coatings”, for application of high performance coating systems to concrete surfaces.
3. Section 081113, Hollow Metal Doors and Frames”, for placement of hollow metal doors and frames.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 ACTION SUBMITTALS

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

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing drawings that show comprehensive details, schedules, plans, elevations and sections for 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.
1. Reproduction of the contract drawings for preparing shop drawings are not permitted.
2. Coordinate reinforcing with other work.
3. Coordinate with Manufacturer of Fabric Covered Steel Frame Salt Barn Building Systems, Appendix, Reference Specifications, Section 133420.

D. Embedded Items: Provide anchor and setting drawings indicating anchorage devices and other embedded items set in concrete 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.

E. Construction Joint Layout: Indicate construction joints shown on the contract drawings and those required for concrete placement to construct the structure.

1.4 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Floor surface flatness and levelness measurements.

D. Form ties

1.5 QUALITY ASSURANCE

A. 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."

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

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

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

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

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

F. Preinstallation Conference: Conduct conference at Project site.

PART 2 - MATERIALS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

A. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

B. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
2. Furnish ties with integral barrier plates to wall surfaces indicated to receive high performance coating.

2.2 STEEL REINFORCEMENT

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

B. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

C. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain steel.

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

E. 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

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/II gray Supplement with the following**:**

a. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
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.

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. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

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 as Sika Ferrogard-901 Corrosion Inhibiting Admixture, or approved equal..

2.5 VAPOR RETARDERS

A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils thick.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

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

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

D. Water: Potable.

E. Clear, Waterborne, Non-Residual Curing Compound: Indicated by the manufacturer to meet ASTM C 309, for moisture retention, non-residual, certified by curing compound manufacturer to not interfere with bonding of coating system for the wall covering.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C309, Type 1, and 1D, Class B.

2.7 RELATED MATERIALS

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

B. 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 IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

C. Hardener: Concrete Sealer, Liquid Chemical Hardener, concrete penetrating high performance colorless, environmentally safe chemical solution that increases the wear surface strength and develops internal bonds which densify the concrete substrate into a hardened, chemically-cured, homogeneous concrete mass that resists abrasion, and reduces oil and water penetration, meeting ASTM C779-30 minute interval with a minimum reduction of wear of 56%, and ASTM C642 with a minimum average reduction of water absorption of 81%.

2.8 CONCRETE MIXTURES

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.

B. Cementitious Materials: Use ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

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

1. Use water-reducing 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 at a minimum dosage rate of 3 gallons per cubic yard of concrete for severe exposure and in accordance with manufactures recommendations.

D. Proportion all normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
6. Corrosion-inhibiting admixture: Minimum of 3 gallons per cubic yard of concrete.

2.9 FABRICATING REINFORCEMENT

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

2.10 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, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - CONSTRUCTION METHODS

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Do not chamfer exterior corners and edges of permanently exposed concrete unless indicated.

3.2 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 to securely and accurately place embedded items.

1. As directed by the owner, coordinate the cast in anchor bolts supplied by the salt barn manufacturer for salt barn, and overhead door, and accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303 and to tolerances and positions required by salt barn and overhead door manufacturer.

B. All embedded items are not shown on the structural drawings. Coordinate complete setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded to securely and accurately place embedded items for attachment of other work.

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 and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

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

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that 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.

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.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Located and install so strength and appearance of concrete are not impaired at locations indicated on the approved shop drawings or as approved by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Horizontal joints in footing, slabs, walls and piers will not be permitted.
4. Space vertical joints in walls as indicated.
5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 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. 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. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes, bug holes, and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to wall and pier surfaces and concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated.

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 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. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces to receive concrete floor toppings, to receive mortar setting beds for bonded cementitious floor finishes.

C. 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.

D. 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 and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces 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.

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

3.9 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 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. 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.
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, 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.
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.
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.
5. Comply with ACI 306.1 for Hot Weather Placement or ACI 301 for Cold Weather Placement during the curing period.

3.10 LIQUID FLOOR HARDENER TREATMENT APPLICATION

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 7 days' old.

3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.11 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least 28-days. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 FIELD QUALITY CONTROL

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

B. Inspections:

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

C. 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., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. 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.

3. 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.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.

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

6. 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. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. 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.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. 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.
9. Test results shall be reported in writing to Owner, 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.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
11. 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 Engineer. 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 Engineer.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

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

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when directed by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval. Contractor's prepared repair details for defective concrete shall be approved by the Engineer.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

SECTION 081113

HOLLOW METAL DOORS AND FRAMES

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 hollow-metal work.

B. Related Requirements:
1. Section 033000 "Cast-in-Place Concrete." For installation of anchorages, concrete, reinforcement, and formwork requirements
2. Section 014000 “Quality Requirements” For Engineers Qualifications, testing, and quality requirements.
3. 099113 “Exterior Painting”, For coating requirements.
4. 088700 “Door Hardware” for hardware requirements.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, plates concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages to be cast in concrete, joints, field splices, and connections.
7. Details of accessories.
8. Details required for complete installation.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware as selected by Owner.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

D. Deliver anchorage devices to be installed in cast-in concrete according to shop drawings and so as not to delay the work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Commercial Doors and Frames: NAAMM-HMMA 861.

1. Physical Performance: Level A according to SDI A250.4.

2. Doors:

   a. Type: As indicated in the drawings.
   b. Thickness: 1-3/4 inches.
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G90 galvanized coating.
   d. Edge Construction: Continuously welded with no visible seam.
   e. Core: Steel stiffened.

3. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch, with minimum G90 galvanized coating.
   b. Construction: Full profile welded.

4. Exposed Finish: Prime, intermediate coat, and topcoats as indicated.

2.3 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.4 FRAME ANCHORS

A. Jamb Anchors:

   1. Type: Adjustable Z-shaped galvanized anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide.

B. Embedded Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

   1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.5 MATERIALS

A. Metallic-Coated Steel Galvanized Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

B. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

   2. Weld Anchors to embedment plates as recommended by door manufacturer.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

D. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

E. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to steel surfaces according to ASTM A123.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Top Edge Closures: Close top edges of doors with inverted closures of same material as face sheets.
2. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
3. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Z-Clip Type: Locate Z-Clip anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Four anchors per jamb.
5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

D. Fabricate concealed stiffeners from ASTM A653 steel sheet and galvanized.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
3. Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
4. Keying: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set.

2.7 PERSONNEL DOORS AND FRAMES

A. Swinging Personnel Doors and Frames: Provide and install two personnel doors with galvanized doors and frames; prepared and reinforced at strike and at hinges to receive factory and field-applied hardware according to BHMA A156 Series.

1. Anchors and Accessories: Manufacturer's standard units, galvanized according to ASTM A123 and as required to complete installation.
2. Fabrication: Fabricate doors and frames to be rigid; neat in appearance; and free from defects, warp, or buckle. Provide continuous welds on exposed joints; grind, dress, and make welds smooth, flush, and invisible.

2.8 STEEL FINISHES FOR PERSONNEL DOORS AND FRAMES

A. Galvanized:
1. Hot-Dip Galvanized: Finish, clean, pretreat, apply zinc coating by the hot-dip process according to ASTM A 123/A 123M.
2. Metallic-Coated Steel Galvanized Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

B. Prime Finish: Clean, pretreat, and apply primer.

1. Shop Primer: Fast-curing, high solids, low VOC, lead- and chromate-free primer, rust inhibitive, phenolic alkyd primer, recommended by primer manufacturer for substrate; compatible with substrate intermediate and top coats and field-applied coatings despite prolonged exposure. MPI #79.

C. Applied Paint Finish:

1. Intermediate coat: High solids, low VOC, alkyd, gloss, MPI #48.
2. Top Coat: High solids , low VOC, alkyd, gloss, MPI #48.
3. Color, as Gloss level 6: As indicated by manufacturer's designations and selected by owner from full range of samples.

2.9 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

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

3.2 PREPARATION

A. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames for doors of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    b. Install frames with removable stops located on secure side of opening.
    c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    e. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Embedded Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with Z-Clip anchors.
3. Concrete Walls: Solidly fill space between frames and concrete with grout.
4. In-Place Concrete: Secure frames in place with welded anchors, and fill and make smooth, flush, and invisible on exposed faces.
5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/8 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/8 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/8 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/8 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/32 inch.
c. At Door Sills with Threshold: 3/8 inch plus or minus 1/32 inch.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint, primer, intermediate and top coats, according to manufacturer's written instructions

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Costs include all labor, material, services and equipment necessary to complete the work in every respect.

END OF SECTION

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SECTION 088700

DOOR HARDWARE

PART 1 - GENERAL

1.1 SCOPE:

A. Furnish all labor, materials, equipment and appliances required for the complete execution of Work as shown on Drawings and specified herein.

1.2 RELATED DOCUMENTS:

A. Drawings, Technical Specification Section, General and Supplementary Conditions of the Contract, and other Division 00 and Division 01 Specification Sections, apply to this Section.

B. Specifications throughout all Divisions of the Project Manual are directly pertinent to this Section, and this Section is directly pertinent to them.

1.3 RELATED SECTIONS:

A. Section 013300: Submittal Procedures

B. Section 081113: Hollow Metal Doors and Frames

1.4 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS:

A. Without limiting the generality of these specifications, the Work shall conform to the pertinent requirements of the following documents:

1. ANSI/BHMA 156.

2. Americans with Disabilities Act (ADA).

3. NFPA 101: Life Safety Code.

4. National Builders Hardware Association, Recommended Locations for Builders Hardware.

5. UL, Hardware, automatice Flush or Surface Bolts.

6. UL, List of Inspected Fire Protection Equipment and Materials.

7. UL, Building Materials Directory.

8. National Fire Protection Association, Standard for Fire Doors and Windows No. 80.

1.5 SUBMITTALS:

A. Contractor shall submit the following:

1. Manufacturer's data for each item of hardware: Include installation and maintenance instructions. Indicate numbers, finishes and other pertinent data.

2. Furnish templates to fabricators of other work which is to receive hardware.

3. Hardware schedule organized into "hardware sets," indicating complete designation of every item required for each door opening. Furnish initial draft of schedule at the earliest possible date, in order to facilitate the fabrication of other work (such as hollow metal frames) which may be critical in the project construction schedule. Furnish final draft of schedule after manufacturer's data sheets and coordination with shop drawings for other work, delivery schedules and similar information had been completed and accepted. Hardware numbering system shall include number indicated on Drawings.

4. Comply with Section 01 33 00, Submittals.

1.6 QUALITY ASSURANCE:

A. Provide materials, assembies, equipment and services from a single source for each category except that locksets, latchsets and cylinders must originate form the same manufacturer.

B. Replace any item of finish hardware which cannot be installed or will not function properly.

C. Provide hardware complying with NFPA 80 and UL labeled for fire rated openings including all interior doors, and complying with NFPA 101 for all exit doors.

D. Furnish templates or information to door and frame manufacturer. Coordinate between the different manufacturers where two or more articles of hardware are to be mounted on the same door. Verify all dimensions, new and existing.

E. Coordinate hardware with othe work. Furnish hardware items of proper design for use on doors and frames of the thicknesses, profile, swing, security and similar requirements indicated, as necessary for proper installation and function.

1.7 DELIVERY, STORAGE, AND HANDLING:

A. Handle, store, distribute, protect and install hardware in accordance with manufacturer's instructions or recommendations. Deliver packaged materials in original containers with seals unbroken and labels intact.

B. Properly mark or label, so each piece of hardware is readily identifiable with the approved hardware schedule. Tag each change key or otherwise indentifying the door of which its cylinder is intended. No individual change key is needed if contractor cores and keys are used. Where double cylinder functions are used, or where it is not obvious which is the key side of the door, appropriate instructions shall be included with the lock and hardware schedule. No door may have asylum or double locking function because of egress of any building according to NFPA 101.

C. Provide secure storage area for hardware.

PART 2 - PRODUCTS

2.1 MATERIALS AND FABRICATION:

A. Hand of Door:

1. Drawings show swing or hand of each door leaf (left, right, reverse bevel, etc.).

2. Furnish hardware for proper installation and operation of door.

B. Manufacturer's Name Plate:

1. Do not use manufacturer's products which have a name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels.

C. Base Metals:

1. Produce hardware units of the basic metal and forming method indicated, using manufacturer's non-corrosive metal alloy, composition, temper and hardness but in no case of lesser quality material than specified.

2. All stainless steel shall be Type 316 satin finish, US32D, unless specified otherwise.

3. All aluminum shall have clear anodized finish AA M10C22A41, unless specified otherwise.

D. Fasteners:

1. Manufacturer hardware to conform to published templates, generally prepared for machine screw installation.

2. Do not provide hardware which has been prepared for self tapping sheet metal screws, except as specifically indicated.

3. Furnish stainless steel fasteners, Type 316, for installation with each hardware item. Exposed finish (under any condition) to match hardware finish or surfaces of adjacent work. Match the finish of adjacent work as closely as possible, including surfaces to receive painted finish.

4. Provide fasteners which are compatible with unit fastened and the substrate, and which will not cause corrosion of deterioration of finish hardware, base material or fastener.

5. Provide concealed fasteners not exposed when the door is closed, except to the extent no standard manufactured units of the type specified are available with concealed fasteners.

6. Use machine screws or concealed fasteners to mount hardware. Use through bolts only where adequate reinforcement of Work cannot be attained.

7. Provide Phillips flat-head installation screws with each finish hardware item except as otherwise specified. Furnish exposed screws to match hardware.

E. Tools for Maintenance:

1. Furnish three (3) full sets of specialized tools as needed for Owner's continued adjustment, maintenance, removal and replacement of builder's hardware.

F. Hardware Finishes:

1. Stainless steel, US32D or BHA 630, unless otherwise noted.

G. Field Checks:

1. Make periodic checks during installation of finish hardware to ascertain the correctness of the installation. After completion of the work, certify in writing, that all items of finish hardware have been installed, adjusted, and are functioning in accordance with Specification requirements, and furnish a copy of such written certification to the locksmith and to Owner.

2.2 DESCRIPTION AND PRODUCTS:

A. Hinges:

1. Stainless steel full mortise concealed oil impregnated ball bearing type, five knuckle with non-rising pins for interior doors, and non-removable and non-rising pins for exterior doors. Tips shall be flat.

2. Sizes and weights of hinges:

a. Doors up to 36 inches: 4-1/2 incheses regular weight.

b. Doors 36 inches to 40 inches: 5 inches regular weight.

c. Doors 40 inches to 48 inches: 5 inches heavy weight.

3. Provide three hinges per door leaf up to and including 90 inches, and one additional hinge for each 30 inches of additional height.

4. Acceptable Manufacturers: Stanley Hardware, Hager Hardware, McKinney.

B. Locksets and Latchsets:

1. Stainless steel (US630), heavy-duty mortise type conforming to ANSI A156.13 Series 1000, Grade 1.

2. Wrought steel box strikes.

3. Stainless steel dead-bolt with 1" throw approval.

4. 2-3/4 inch back set, 3/4 inch throw, two-piece anti-friction latchbolt.

5. Non-ferrous critical internal parts.

6. Cylinders housing shall be manufactured to conform to Owner grand master key program.

7. Trim Desgin: Stanley best 15J with wrought escutcheon by Stanley Best only and no equal. Provide knurling on all levers leading into hazardous rooms and electrical rooms.

8. Acceptable Manufacturers: Stanley Best only and no equal.

C. Closers:

1. Cast iron with seamless one-piece forged steel spring tub.

2. Heavy duty forged steel arm.

3. Non-sized fully adjustable from size 1-6.

4. Backcheck intensity and location valves.

5. Delayed action closing for electronic ADA compatible.

6. Full metal cover.

7. Mechanical hold open device, except at fire rated doors.

8. ANSI 156.1, Grade 1.

9. Conforms to ADA 5 lbf. Maximum door opening force requirement for non-fore rated interior doors, and NFPA 15 lbf. Maximum door opening force for fire-rated doors.

10. Provide mounting brackets and fasteners required for proper attachement.

11. Provide closers at fire rated doors.

12. Provide manufacturers 10-year warranty.

13. Acceptable Manufacturers: LCN only and no equal.

D. Door Stops and Bumpers:

1. Finish: Satin chrome plated US26D or ANSI 630.

2. Floor mounted door stops.

   a. Acceptable manufacturers and products: H.B. Ives 444, Hager Hardware Model 267F, and Glynn-Johnson Model FB36.

3. Wall bumpers.

a. Acceptable manufacturers and products: H.B. Ives Model 407, Hager Hardware Model 234W, and Glynn-Johnson Model 60C.

E. Silencers:

1. Rubber silencers: four (4) for each single door, and three (3) for each double door.

2. Acceptable manufacturers and products: Glynn-Johnson Models 64 or 65, Hager Hardware Models 308D or 307D, H.B. Ives Models 20 or 21.

PART 3 - EXECUTION

3.1 GENERAL:

A. Templates:

1. After the hardware schedule is approved, furnish to the various manufacturers, required blueprint templates for fabrication purposes. Templates shall be made available not more than ten (10) days after receipt of the approved hardware schedule. Furnish a copy of templates to the Owner locksmith.

B. Packaging and Marketing:

1. Ship hardware with proper non-corrosive fastenings for secure application. Each package of hardware shall be legibly marked indicating the part of the work for which it is intended. Markings shall correspond with the item numbers shown on the approved hardware schedule. Keys shall be tagged within each package set and plainly marked on the face of the envelope with the key control number, door designation and all identification as necessary.

3.2 SHOP DRAWINGS:

A. Furnish door and frame manufacturer’s reviewed hardware schedule and hardware templates.

B. Submit finish hardware schedule in a manner and format specified below. Indicate complete designation of every item required for each door.

1. Hardware schedule shall be verticle type. Include a door index with cross reference to door callouts shown on the Drawings and hardware indicated in the Schedule. Include a vendor listing of the various manufacturers.

3.3 INSTALLATION:

A. The finish hardware installer shall have demonstrated sufficient experience and skills to satisfactorily install and adjust all hardware in a neat and workmanlike manner.

B. Hardware Supplier shall visit the job-site at least twice during construction to assist and advise the installation of the hardware. Notify Owner when these visits are scheduled.

C. Install hardware in a manner which will eliminate cracks on surfaces.

D. Mount hardware units at heights recommended in "Recommended Locations for Builders Hardware" by BHMA, except as otherwise indicated or required to comply with governing regulations.

E. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on the substrate.

F. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as is necessary for proper installation and operation.

G. Dril and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with factory standards.

3.4 ADJUST AND CLEAN:

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function. Lubricate moving parts as recommended by manufacturer. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application.

B. Final Adjustment:

1. One week prior to acceptance or occupancy, make a final check and adjustment of all hardware items. Clean and relubricate operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices and compensate for final operation of heating and ventilating equipment.

2. Instruct Owner personnel in proper adjustment and maintenance of hardware and hardware finishes during the final adjustment of hardware.

3.5 HARDWARE SETS:

A. Hardware Sets:

1. Provide hardware set in accordance with the hardware schedule indicated.

2. Provide number of pairs of butt hinges in accordance with previously specified requirements.

3. Designations used to describe hardware items by using manufacturer's product name and number are for the purpose of describing a general level of quality and function. Products

that are equal, complying with the requirements specified in this section may be used, except as specified otherwise herein.

3.6 HARDWARE SCHEDULE

HARDWARE PER DOOR	QUANTITY
FULL LENGTH CONTINUOUS HINGES	1 SET
LATCH SET	1 EACH
LOCK SET	1 EACH
SILENCERS	1 SET
DOOR CLOSURE	2 EACH
DOOR STOP	1 EACH

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. No separate measurement shall be made for work under this section.

PART 5 - BASIS OF PAYMENT

5.1 METHOD OF PAYMENT

A. No separate payment will be made for work under this Specification Section. The cost of the work, complete in place, described in this Specification Section shall be included in the respective Lump Sum Bid.

B. Cost includes all labor, material, services, and equipment necessary to complete the work in every aspect.

END OF SECTION