

Project Manual

For

Ross CVDC Hotel Conversion

Shafter, California

**Issue for Permits 1 & 2
September 27, 2019**

Architect

H+M

Architects / Engineers

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SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: CVDC Hotel Conversion-Permits 1 & 2
- B. Owner's Name: Ross Dress for Less, Inc..
- C. The Project includes materials, labor, transportation, security, temporary facilities, and other items identified in, or reasonably inferable from the construction Drawings and Project Manual for retrofitting the existing rack storage facility to accomodate new MHE Equipment

1.02 DIVISION 01 SPECIFICATIONS

- A. Division 01 General Requirements expand on the broad provisions of the Conditions of the Contract, and govern the execution of the work of all Sections of the specifications. Division 01 General Requirements specify administrative and procedural requirements relating to execution of the Work, and temporary facilities for use during the construction period.

1.03 PROJECT WARRANTY AND CORRECTION PERIOD.

- A. The following Correction Period provisions of the Contract Documents:
 - 1. Unconditional Agreement to Remedy: Neither Architect's approval of the final request for payment nor payment of any request for payment or of any sum previously withheld from Contractor shall relieve Contractor of responsibility for its warranty and guarantee hereunder or for faulty materials or workmanship, and unless otherwise agreed, Contractor unconditionally agrees to remedy any defects due thereto, and pay for any damages resulting therefrom, which shall appear within a period of one year from the date of Substantial Completion.
- B. Extended Warranties:
 - 1. As identified in other Sections of the specifications, provide written manufacturer's guarantees and warranties for specific materials, products, and equipment furnished and installed under this Contract.
 - 2. Guarantees and Warranties Period: Valid for the stated extended period beyond 24 months from the date of Substantial Completion of the Work.
- C. Exclusions:
 - 1. Warranty requirements contained in the specifications take precedence. These exclusions are superseded by warranty coverage requirements of the specifications.
 - 2. Notify Architect of design conditions which cannot be fully warranted. Submit notice in writing prior to purchase of the affected product or system.
 - 3. Failure to provide such notice will not be grounds for waiver of warranty requirements contained in the specifications.
 - 4. Upon receipt of such notice, Architect will consider modifications necessary to assure that final construction is warrantable to the full extent of Contract requirements.

1.04 WORK INCLUDED:

- A. Be responsible for furnishing labor, materials, tools, appliances, services, and facilities required to complete work as shown on the drawings as described in Technical Specifications listed in the Index and further in accordance with applicable provisions of General Conditions and Division 1 of Technical Specifications.
- B. Specific work required shall be as described under "Scope of Work" paragraph of each section of this specification and as detailed on drawings. Specifications are intended to complement the drawings and all work required by drawings and/or specifications shall be responsibility of contractor. Any conflicts between working drawings and specifications shall be called to the attention of Engineer prior to start of work.

1.05 CODES AND STANDARDS:

- A. Codes and standards adapted by the local governmental agencies having justification and any codes or standards referenced in individual sections of the Specifications and General Conditions.

1.06 MATERIAL DELIVERY, STORAGE AND HANDLING:

- A. All materials and equipment required for the project shall be delivered, stored and handled in a manner to prevent damage and deterioration. Materials stored outside shall be stored on raised pallets and where applicable, shall be covered to protect the materials from the weather.
- B. When specifically recommended by the manufacturer, materials shall be stored in dry and protected areas and maintained at recommended temperatures.

1.07 COORDINATION AND COOPERATION:

- A. Coordinate the work with other Contractors on project and with Owner. Work shall be coordinated so as to avoid delays in completion of project or interference with Owner's utilization of finished spaces.
- B. Contractor shall work closely with Owner to provide access and egress to work area during construction.

1.08 INSPECTION:

- A. Before starting the work, Contractor shall examine adjoining work on which their work is in any way dependent for its acceptable installation and he shall report any unsatisfactory conditions. Starting of work shall constitute acceptance of all conditions and removal and replacement of any work installed unsatisfactorily shall be at expense of the Contractor.
- B. Be responsible for field measurements required to verify dimensions shown on drawings and necessary to ensure proper fitting of his work. Contractor shall be responsible for ascertaining any supplementary dimensions that are required for successful execution of his work.

1.09 CLEANUP:

- A. Refuse and debris accumulating from work required to complete this project shall be removed from building site throughout the course of project with intervals between cleanup not exceeding 7 days.
- B. Prior to final acceptance of the work, premises shall be left broom clean insofar as affected by Contractor's work.
- C. Windows, doors and door frames shall be cleaned prior to final inspection.
- D. Painted surfaces that have been soiled by subsequent construction activities shall be cleaned or repainted as required to restore original finish.

1.10 ACCIDENT PREVENTION:

- A. Comply with safety and engineering practices set forth in "Manual of Accident Prevention in Construction", published by Associated General Contractors of America and with all applicable state and local safety and sanitary laws, regulations and ordinances, as well as established safety rules and practices of Owner. Contractor shall, at his own expense, properly protect Owner's property from injury and shall make good any damage to same caused by failure to exercise required care during this work.
- B. Provide properly maintained warning signs, lights, barricades, railings and other safeguards for protection of workmen and others on or about or adjacent to the work.
- C. Provide employees with approved eye protection, protective head gear, etc., while performing work required for this project.
- D. Comply with applicable safety laws and regulations.

1.11 FIRE PREVENTION AND PROTECTION:

- A. Contractor shall take all necessary precautions to guard against and eliminate all possible fire hazards and to prevent damage to any work, equipment and building.

- B. No welding, flame cutting or other operations involving use of flame, arcs or sparking devices shall be allowed without adequate protection and shielding. All combustible or flammable material shall be removed from immediate working area and shall be adequately protected with asbestos fire blankets or suitable noncombustible shields. Further, contractor shall provide necessary personnel and fire fighting equipment to effectively control incipient fires resulting from welding, flame cutting or other operation required for demolition work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of modifications in Contract Sum and Contract Time.
- C. Modification procedures.
- D. Correlation of Contractor submittals based on modifications.
- E. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

- A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- B. Forms filled out by hand will not be accepted.
- C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
- D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.
- F. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
- G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
 - 1. Forms filled out by hand will not be accepted.
- D. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.
- E. Execute certification by signature of authorized officer.
- F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- H. Submit one electronic and three hard-copies of each Application for Payment.
- I. Include the following with the application:

1. Transmittal letter as specified for Submittals in Section 01 3000 - Administrative Requirements.
 2. Construction progress schedule, revised and current as specified in Section 01 3216 - Construction Progress Schedule.
 3. Current construction photographs specified in Section 01 3000 - Administrative Requirements.
 4. Conditional release of liens from each Subcontractor and vendor for the current month's payment application, and unconditional release of liens from each Subcontractor and vendor for the previous month's payment application.
 5. Affidavits attesting to off-site stored products.
- J. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.04 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 7000.
 2. Receipt of final Certificate of Occupancy from jurisdictional authority.
 3. Acceptance or Work by Owner and Architect.
 4. Consent of Surety.

1.05 NON-CONFORMING WORK

- A. Payment will not be made for non-conforming work. Non-conforming work is defined as work not meeting the requirements of the Contract Documents, rejected work, wasted products, products unacceptable after placement, products remaining after installation, loading, hauling, and storage of related products.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 2300
ALTERNATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Price and Contract Time.

1.02 SCOPE OF WORK:

- A. Furnish labor, materials, tools, equipment and supplies to complete work required by the Alternatives hereinafter described. Work shall be completed in accordance with requirements shown on the drawings and described in the referenced Technical Specifications.
- B. Work required by these alternatives shall further comply with applicable requirements of the general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections.

1.03 DESCRIPTION OF REQUIREMENTS: 16 CFR 1201

- A. Definition: An alternate is an amount proposed by bidders and stated in the Bid Form that will add to or deduct from base bid amount if the Owner decides to accept a corresponding change in either the scope of work or in products, materials, equipment, systems or installation methods described in the contract documents.
- B. Coordination: Coordinate related work and modify or adjust adjacent work as required to ensure the work affected by each accepted alternate is complete and fully integrated into the project.
- C. Notification: Immediately following award of contract, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alter-nates, if any.
- D. Schedule: "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the work described under each alternate.
- E. Include as part of each alternate miscellaneous devices, appurtenances and similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.

1.04 VOLUNTARY ALTERNATES:

- A. Bidders are encouraged to submit voluntary alternates for the Owner's consideration. Voluntary Alternates shall be proposed to reduce cost without affecting quality or function, or to improve upon quality levels specified in the Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2500
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Contract is based upon products and standards established in Contract Documents without consideration of proposed substitutions.
- C. Products specified define standard of quality, type, function, dimension, appearance and performance required.
- D. Substitution proposals are permitted for specified products, except where specified otherwise.
- E. Do not substitute products unless substitution has been accepted and approved in writing by Architect/Owner.

1.02 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.

1.03 TIME OF SUBSTITUTION REQUESTS

- A. Within 30 days after award of Contract or Notice to Proceed, Architect will consider formal substitution requests from Contractor only. Use attached "Substitution Request Form." No requests for substitutions will be accepted after that time without Owner's authorization and with following stipulation.
- B. Architect will record time required for evaluating substitutions proposed by Contractor after receipt of bids, and for making changes in the Contract Documents. Whether or not Architect accepts Contractor proposed substitution, Contractor shall reimburse Owner for charges of Architect and Architect's consultants for evaluating each proposed substitution.
- C. No additional substitutions will be considered after this initial process unless a substitution is required due to specified product being removed from or unavailable in market place.

1.04 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 facsimile of form provided in Project Manual.
 - 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. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. 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.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. 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.
 - m. 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. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or [seven] 7 days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.05 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.

1.06 PROCEDURES

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

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

- A. Whenever a product is specified by using a proprietary name or the name of a particular manufacturer or vendor, the specific item mentioned shall be understood as establishing type, function, dimension, appearance, and quality desired. Other manufacturers' products might be accepted, provided sufficient information is submitted to allow the A/E to determine that products proposed are equivalent to those named.
- B. 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: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect 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. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, 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.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- 1. Architect will record time required for evaluating substitutions proposed by Contractor after start of construction, and for making changes in the Contract Documents. Whether or not Architect accepts Contractor proposed substitution, Contractor shall reimburse Owner for charges of Architect and Architect's consultants for evaluating each proposed substitution.
 - 2. No additional substitutions will be considered after this initial process unless a substitution is required due to specified product being removed from or unavailable in market place.
 - 3. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution provides sustainable design characteristics that specified product provided .
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.
 - k. If requested substitution involves more than one contractor, 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.

2.02 SUBSTITUTION PROCEDURES

- A. Limit each request to one proposed substitution.
- B. Submit substitution requests on attached form complete with attachments necessary to fully document proposed substitution. Submit in number of copies required for Contractor's use and distribution, plus one copy to be retained by Architect.

- C. Copy of required form is bound after last page of this Section. Remove form for making additional copies or request an original copy from Architect.
- D. Document each request with supporting data substantiating compliance of proposed substitution with Contract Documents, including:
 - 1. Manufacturer's name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.
 - 2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance and other pertinent characteristics.
 - 3. Reference to article and paragraph numbers in Specification section.
 - 4. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
 - 5. Changes required in other Work.
 - 6. Availability of maintenance service and source of replacement parts, as applicable.
 - 7. Certified test data to show compliance with performance characteristics specified.
 - 8. Samples, when applicable or requested.
 - 9. Other information as necessary to assist Architect's evaluation.
- E. A request for substitution for an equivalent product constitutes a representation that Contractor:
 - 1. Has investigated proposed product and determined that it is equal or superior in all respects to specified product.
 - 2. Will provide warranty as required for specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Certifies that proposed product will not affect or delay Construction Progress Schedule.
 - 6. Will pay for changes to building design, including architectural or engineering design, detailing, and construction costs caused by the requested substitution.
- F. Substitutions will not be considered when:
 - 1. Indicated or implied on shop drawings or product data submittals without formal request submitted in accord with this Section.
 - 2. Submittal for substitution request has not been reviewed and approved by Contractor.
 - 3. Acceptance will require substantial revision of Contract Documents or other items of the Work, unless substitution is required to bring Project into GMP compliance.
 - 4. Submittal for substitution request does not include point-by-point comparison of proposed substitution with specified product.

2.03 OWNER AND ARCHITECT'S REVIEW

- A. Architect will review requests for proposed substitutions and make recommendations to Owner on Substitution Request Form with reasonable promptness; Allow 10 working days.
- B. Considerations for acceptance will be based on conformance with Contract Documents, including following as applicable:
 - 1. Physical dimension and clearance requirements to satisfy space limitations.
 - 2. Static and dynamic weight limitations; structural properties.
 - 3. Audible noise levels.
 - 4. Vibration generation.
 - 5. Interchangeability of parts or components.
 - 6. Accessibility for maintenance to allow possible removal or replacement.
 - 7. Design.
 - 8. Colors, textures, and finishes.
 - 9. Compatibility with other materials, products, assemblies, and components.
- C. Owner's decision to approve or reject requested substitution will be indicated on Substitution Request Form. Approval of substitution not valid without Owner's signature.
- D. Rejection of proposed substitution by Owner requires use of specified product.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2501
SUBSTITUTION REQUEST FORM

PROJECT: _____ **SUBSTITUTION REQUEST NUMBER:** _____

1.01 PROJECT INFORMATION

A. From:

B. Date:

C. A/E Project Number:

D. Contract For:

E. Section Title:

Description: _____

F. Section Number: _____ Page: _____ Article/Paragraph: _____

1.02 PROPOSED SUBSTITUTION:

A. Manufacturer:

Address: _____

Phone: _____

B. Trade Name:

_____ Model No.: _____

C. Installer:

Address: _____

Phone: _____

D. New Product: 0-1 year old 2-5 years old 5-10 years old More than 10 years old

1.03 DIFFERENCES BETWEEN PROPOSED SUBSTITUTION AND SPECIFIED PRODUCT:

1.04 POINT-BY POINT COMPARATIVE DATA ATTACHED – REQUIRED BY A/E

1.05 REASON FOR NOT PROVIDING SPECIFIED ITEM:

1.06 SIMILAR INSTALLATION:

A. Project: _____ Architect: _____

B. Address: _____

Owner: _____ Date _____

Installed: _____

C. Proposed substitution affects other parts of Work:

1. No: _____
2. Yes: _____

D.

Explain: _____

E. Savings to Owner for accepting substitution: _____
(\$_____)

F. Proposed substitution changes Contract Time:

1. No: _____
2. Yes: _____
 - a. Add Days: _____ days.
 - b. Deduct Days: _____ days.

G. Attached Supporting Data:

1. Drawings: _____
2. Product Data: _____
3. Samples: _____
4. Tests: _____
5. Reports: _____

H. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.

I. Same warranty will be furnished for proposed substitution as for specified product.

J. Same maintenance service and source of replacement parts, as applicable, is available.

K. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.

L. Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.

- M. Proposed substitution does not affect dimensions and functional clearances.
- N. Payment will be made for changes to building design, including A/E design, detailing, and construction costs by the substitution.
- O. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

1.07 SUBMITTED BY:

1.08 SIGNED BY: _____

1.09 FIRM: _____

1.10 ADDRESS: _____

1.11 TELEPHONE: _____

1.12 ATTACHMENTS: _____

1.13 A/E'S REVIEW AND ACTION

- A. _____ Substitution approved – Make submittals in accordance with Specification Section 01 3300 - Submittal Procedures.
- B. _____ Substitution approved as noted – Make submittals in accordance with Specification Section 01 3300 - Submittal Procedures.
- C. _____ Substitution rejected – Use specified materials.
- D. _____ Substitution Request received too late – Use specified materials.
- E. Signed by: _____
Date: _____

1.14 ADDITIONAL COMMENTS:

1.15 OWNER'S REVIEW AND ACTION

- A. _____ Substitution approved – Make submittals in accordance with Specification Section 01 3300 - Submittal Procedures.
- B. _____ Substitution approved as noted – Make submittals in accordance with Specification Section 01 3300 - Submittal Procedures.
- C. _____ Substitution rejected – Use specified materials.
- D. Signed by: _____
Date: _____

1.16 ADDITIONAL COMMENTS:

END OF FORM

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Contractor's daily reports.
- G. Progress and documentation photographs.
- H. Coordination drawings.
- I. Requests for Interpretation (RFI) procedures.

1.02 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 an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect 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. Email or fax the RFI to H+M Construction, Inc. The email or fax to H+M Construction, Inc. shall be addressed to Graham Salonus, Project Manager, see below.
- C. The standard Request for Information form shall be utilized. Should Construction Management for the project prefer using another standard form, the non-standard form shall still be processed through normal channels.
- D. The General Contractor shall introduce this process to the subcontractors for the project.
- E. RFI's shall be generated using the established form describing pertinent project data and contractor information, concerns, and proposed solutions.
- F. The General Contractor and subcontractors shall fax clarifications, or e-mail directly to H+M Company, Inc.
- G. The following H+M Company personnel are designated to receive all RFIs:
 - 1. H&M Company, Inc.
 - 2. 50 Security Drive
 - 3. Jackson, TN 38305
 - 4. ATTN: Graham Salonus, Construction Project Manager
 - 5. Email: gsalonus@hmcompany.com
 - 6. Office Phone: (731) 660-3178
 - 7. Mobile Phone (480) 234-3232
- H. 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 Architect .
 - 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.
- I. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- J. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 5 working days for Architect's response for each RFI. RFIs received by Architect 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 Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
- K. 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 Architect .
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
- L. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 7 days if Contractor disagrees with response.
 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- M. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
 1. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.

1.03 SURVEYS:

- A. General:
 1. Work from lines and levels established by the existing property lines and fence boundaries. Establish bench marks and markers to set lines and levels for work as needed to properly locate each element of the project.

2. Drawings shall not be scaled to determine dimensions.

1.04 LIMITATIONS ON USE OF SITE:

- A. Confine work where possible to the limit as prescribed by the Construction Manager. Allocate available space equitably among contractors needing both access and space so as to produce the best overall efficiency performance of the total work of the project.
- B. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on the site. Storage of materials and work shall be closely coordinated with the Construction Manager.

1.05 SPECIAL REPORTS:

- A. General:
 1. Submit special reports directly to the Construction Manager within one day of an occurrence. Submit a copy of the report to the Engineer and others that are affected by the occurrence.
 2. When an event of an unusual or significant nature occurs at the site, prepare and submit a special report listing chain of events, persons participating, response by contractor's personnel and evaluation of the results or effects and similar pertinent information.
 3. Prepare and submit reports of significant accidents at the site and anywhere else work is in progress. Record and document data and actions. For this purpose, a significant accident is defined to include events where personal injury is sustained or property loss of substance is sustained or where the event poses significant threat of loss or personal injury

1.06 MANUFACTURER'S INSTRUCTIONS:

- A. Where installations include manufactured products, comply with the manufacturer's applicable instructions and recommendations for installation, to the extent that these instructions and recommendations are more explicit or more stringent than requirements indicated in the contract documents.
- B. Inspect each item of materials or equipment immediately prior to installation. Reject defective or damaged items.
- C. Provide attachment and connection devices and methods for securing work. Secure work true-to-line and level and within recognized industry tolerances. Allow for expansion and building movement.
- D. Install each unit of work during weather conditions in projects that will ensure the best possible results in coordination with the entire work. Isolate each unit of work from incompatible work as necessary to prevent deterioration.
- E. Coordinate enclosure of the work with the required inspections and tests so as to minimize the necessity of uncovering work for that purpose.

1.07 MOUNTING HEIGHTS:

- A. Where mounting heights are not indicated, mount individual units of work at industry recognized standard mounting heights for the particular application indicated. Refer questionable mounting height choices to the engineer for final decision.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 COORDINATION/PROGRESS MEETINGS:

- A. Hold bi-weekly general project coordination and progress meetings at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes such as regular project meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning of the work. Conduct meetings in a manner which will resolve coordination problems.

- C. Record results of the meetings and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting. At contractor's option, monthly coordination meetings can be held concurrent with the pre-installation meetings.

3.02 PRECONSTRUCTION MEETING

- A. Schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. Architect.
 - 2. Contractor.
 - 3. Other invited participants.
- C. Minimum Agenda:
 - 1. Designation of personnel representing the parties to Contract, including Contractor, Owner, and Architect.
 - 2. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 3. Scheduling.
 - 4. Scheduling activities of a Geotechnical Engineer.
 - 5. Tentative construction schedule.
 - 6. Critical work sequencing and long-lead items.
 - 7. Designation of key personnel and their duties.
 - 8. Lines of communications.
 - 9. Procedures for processing field decisions and Change Orders.
 - 10. Procedures for RFIs.
 - 11. Procedures for testing and inspecting.
 - 12. Procedures for processing Applications for Payment.
 - 13. Distribution of the Contract Documents.
 - 14. Submittal procedures.
 - 15. Preparation of record documents.
 - 16. Use of the premises.
 - 17. Work restrictions.
 - 18. Working hours.
 - 19. Owner's occupancy requirements.
 - 20. Responsibility for temporary facilities and controls.
 - 21. Procedures for moisture and mold control.
 - 22. Procedures for disruptions and shutdowns.
 - 23. Construction waste management and recycling.
 - 24. Parking availability.
 - 25. Office, work, and storage areas.
 - 26. Equipment deliveries and priorities.
 - 27. First aid.
 - 28. Security.
 - 29. Progress cleaning.
- D. Record minutes and distribute electronically within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

- A. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors.
- B. Minimum Agenda:

1. Use of premises by Owner and Contractor.
 2. Owner's requirements.
 3. Construction facilities and controls provided by Owner.
 4. Temporary utilities provided by Owner.
 5. Survey and building layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- C. Record minutes and distribute electronically within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PRE-INSTALLATION CONFERENCES:

- A. Hold pre-installation meetings at the project well before installation of each unit of work, which requires coordination with other work. Installer or representatives of the manufacturers or fabricators who are involved in that unit of work and with its coordination or integration with other work shall attend this meeting. Advise Owner of schedule meeting dates.
- B. As a minimum, pre-installation meetings should be held prior to start of structural fill work, floor slab construction, masonry, structural steel, roofing, mechanical, and electrical work.
- C. At each meeting, review progress of other work and preparations for the particular work under consideration. Also, emphasize requirements of the contract documents for quality control.
- D. Record significant discussions of each conference and record agreements and disagreements along with a final plan of action. Distribute the record of the meeting promptly to everyone concerned including the Owner.

3.05 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-weekly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers as necessary, Owner, Architect, as appropriate to agenda topics for each meeting.
- D. Minimum Agenda:
 1. Review minutes of previous meetings.
 2. Review of work progress.
 3. 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.
 - a. Review 3 week look ahead schedule for next period.
 4. Field observations, problems, and decisions.
 5. Review of RFI log and status of RFI's.
 6. Identification of problems that impede, or will impede, planned progress.
 7. Review of submittals schedule and status of submittals.
 8. Modification (Change Order) status.
 9. Review of off-site fabrication and delivery schedules.
 10. Maintenance of progress schedule.
 11. Corrective measures to regain projected schedules.

12. Planned progress during succeeding work period.
 13. Coordination of projected progress.
 14. Maintenance of quality and work standards.
 15. Effect of proposed changes on progress schedule and coordination.
 16. Documentation of information for payment requests.
 17. Other business relating to work.
- E. Record minutes and distribute electronically within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.06 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 1. Include written certification that major Subcontractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.07 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. In addition to transmitting electronically a copy to Owner and Architect, submit two printed copies at weekly intervals.
 1. Submit in format acceptable to Owner.
 2. Submit using required form, a sample of which is appended to this section.
- C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
 1. Date.
 2. High and low temperatures and general weather conditions, including presence of rain or snow.
 3. List of subcontractors at Project site.
 4. List of separate contractors at Project site.
 5. Approximate count of personnel at Project site.
 - a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
 6. Major equipment at Project site.
 7. Material deliveries.
 8. Safety, environmental, or industrial relations incidents.
 9. Meetings and significant decisions.
 10. Unusual events (submit a separate special report).
 11. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
 12. Meter readings and similar recordings.
 13. Emergency procedures.
 14. Directives and requests of Authority(s) Having Jurisdiction (AHJ).
 15. Change Orders received and implemented.
 16. Construction Change Directives received and implemented.
 17. Orders and requests of authorities having jurisdiction.

18. Services connected and disconnected.
 19. Equipment or system tests and startups.
 20. Partial completions and occupancies.
 21. Substantial Completions authorized.
 22. Testing and/or inspections performed.
 23. List of verbal instruction given by Owner and/or Architect.
 24. Signature of Contractor's authorized representative.
- D. Weekly Progress Reports:
1. At each progress meeting, present three week schedule of current construction activities. Indicate planned and actual activities and dates for the previous week, the current week and the following week. Present in a consistent format to enable easy comparisons of current activities to previous period and overall schedule.
 2. If requested by Owner or Architect, provide detailed information on early and late start dates, early and late finish dates, float durations, and activities which precede and succeed each activity.
- E. Monthly Progress Reports:
1. Submit monthly progress reports to Architect indicating actual progress of Work. Submit in same format as approved construction schedule.
 2. Monthly Progress Schedule Update: Clearly mark or highlight changes in construction sequence, planned durations, benchmark dates, or other changes to approved schedule.
- F. 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.
- G. 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.
- H. Applications for payment must include monthly progress report. Applications for payment will not be processed without current progress report, report is inaccurate, or report is inconsistent with application for payment.

3.08 PROGRESS PHOTOGRAPHS AND DOCUMENTATION

- A. Document existing conditions in the work area prior to start of demolition. Take initial photographs in quantity and at locations required to fully document existing conditions which may become concealed as the result of new Work.
- B. Submit initial photographs to Owner and Architect, and discuss existing conditions that are a concern of Contractor in relation to proposed new Work.
- C. Take additional photographs as Work progresses, at same locations and from same viewing angles as initial photographs.
- D. Submit additional photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- E. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- F. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.
- G. Photography Type: Digital; electronic files; each photograph integrally date-stamped.
- H. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.

- I. In addition to periodic, recurring views, take photographs of each of the following events:
 - 1. Completion of site clearing.
 - 2. Excavations in progress.
 - 3. Foundations in progress and upon completion.
 - 4. Structural framing in progress and upon completion.
 - 5. Enclosure of building, upon completion.
 - 6. Final completion, minimum of ten (10) photos.
- J. Indoor Air Quality Control Documentation: Take minimum 6 photographs at three different occasions (minimum 18 total) during construction of the different SMACNA requirements, and provide a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts, cleaning of air handling units, installation of filters, and on-site stored or installed absorptive materials.
- K. Views:
 - 1. Provide aerial photographs from four cardinal views at each specified time, until structure is enclosed.
 - 2. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
 - 3. Consult with Architect for instructions on views required.
 - 4. Provide factual presentation.
 - 5. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- L. Digital Photographs: 24 bit color, minimum resolution of 1600 by 1200 ("2 megapixel"), in JPG format; provide files unaltered by photo editing software.
 - 1. Delivery Medium: On photo CD.
 - 2. File Naming: Include project identification, date and time of view, and view identification.
 - 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
 - 4. Photo CD(s): Provide 1 copy including all photos cumulative to date and PDF file(s), with files organized in separate folders by submittal date.

3.09 DIGITAL DRAWING FILES

- A. Architect's Digital Files: Upon request by Contractor, a digital copy of Project Building Information Model (BIM) or CADD Drawing files will be provided as a courtesy for Contractor's limited use. Such information is not considered to be a part of the Contract Documents.
 - 1. Use of this information is at Contractor's sole risk.
 - 2. Report to Architect discrepancies, if any, between published Contract Documents and information provided according to General Conditions and other administrative requirements of the Contract.
 - 3. Prior to receiving digital files, execute data licensing agreement; AIA Document C106.
 - 4. The following files will be furnished free of charge, if requested:
 - a. Building floor plans.
 - b. Reflected ceiling plans.
 - 5. Submittals prepared using any of these files as the primary submittal content without the inclusion of substantial additional content generated by Contractor according to specified requirements for applicable submittals will not be accepted or reviewed by Architect.

3.10 CLEANING AND PROTECTION:

- A. During handling and installation of the work at the project site, clean and protect work in progress and adjoining work on a continuing basis.
- B. To the extent possible, through reasonable control and protection methods, supervise performance of the work in such a manner by such means that will ensure that none of the work whether completed or in progress will be subjected to harmful, dangerous, damaging or other deleterious exposures during the construction period.

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Construction progress schedule, with network analysis diagrams and reports.

1.02 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 5 days.
- C. Within 10 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 5 days after joint review, submit complete schedule.
 - 1. Payment applications will not be processed by Owner until complete schedule is submitted.
 - 2. Owner reserves right to require reasonable modifications to schedule to accommodate special circumstances.
- E. Submit updated schedule with each Application for Payment.
- F. Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Architect.

1.03 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with two years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.
- B. Contractor's Administrative Personnel: Two years minimum experience in using and monitoring CPM schedules on comparable projects.

1.04 SCHEDULE FORMAT

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification Section number.
- B. Diagram Sheet Size: Maximum 22 x 17 inches.
- C. Sheet Size: Multiples of 8-1/2 x 11 inches.
- D. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a preliminary network diagram.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification Section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules to define critical portions of the entire schedule.

- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- F. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
- G. Coordinate content with schedule of values specified in Section 01 2000 - Price and Payment Procedures.
- H. Provide legend for symbols and abbreviations used.
- I. Minimum Content:
 - 1. Permit application, review, and permit issue time.
 - 2. Submittal preparation time.
 - 3. Submittal review time; include specified duration in days for each submittal.
 - 4. Resubmittal time and review.
 - 5. Product production and delivery time.
 - 6. Temporary facilities and protection.
 - 7. Systems testing.
 - 8. Inspections by permitting authorities.
 - 9. Substantial Completion inspection.
 - 10. Completion of punch list work.
 - 11. Verification inspection.
 - 12. Systems operational training.
 - 13. Final closeout processes, including submittal of operation and maintenance manuals and Project Record Documents.
- J. Schedule Limits: Commence with the issue of Notice to Proceed and terminate with Final Acceptance for the Project. Establish Date of Substantial Completion to allow Owner to occupy Project and accept Work by date specified in Agreement.

3.03 GANTT-CHARTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for 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.
- C. Include a separate bar for each major portion of Work or operation.
- D. Identify the first work day of each week.

3.04 NETWORK ANALYSIS

- A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.
- B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.
- C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
 - 1. Preceding and following event numbers.
 - 2. Activity description.
 - 3. Estimated duration of activity, in maximum 15 day intervals.
 - 4. Earliest start date.
 - 5. Earliest finish date.

6. Actual start date.
 7. Actual finish date.
 8. Latest start date.
 9. Latest finish date.
 10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
 11. Monetary value of activity, keyed to Schedule of Values.
 12. Percentage of activity completed.
 13. Responsibility.
- D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and recomputation of all dates and float.
- E. Required Reports: List activities in sorts or groups:
1. By preceding work item or event number from lowest to highest.
 2. By amount of float, then in order of early start.
 3. By responsibility in order of earliest possible start date.
 4. Contractor's periodic payment request sorted by Schedule of Values listings.

3.05 REVIEW AND EVALUATION OF SCHEDULE

- A. Participate in joint review and evaluation of schedule with Architect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.06 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.
- G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

3.07 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 3300
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals for review, information, and project closeout.
- B. Number of copies of submittals.
- C. Submittal procedures.

1.02 SUBMITTAL SCHEDULE

- 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 Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Prepare a separate listing showing principal, work-related submittals and the initial submittal dates required for coordination and scheduling of the work. Organize the listing by the related specification number sequence. Submit the listing to Engineer within 30 days of the date of commencement of the work.
 - 2. Schedule dates for submittal preparation and submission shall be sufficiently in advance of scheduled performance of related work to avoid construction delays.
 - 3. Allow sufficient time so that the installation will not be delayed as a result of the time required to properly process submittals, including time for resubmittal, if necessary. Advise the Engineer on each submittal as to whether processing time is critical to the progress of the work and if the work would be expedited if processing time could be shortened. Allow a minimum of two weeks for the Engineer's initial processing of each submittal.
 - 4. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 5. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - 6. 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.
 - 7. 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.
 - 8. Format: Arrange the following information in a tabular format:
 - a. Add information, such as scheduled dates for purchasing and installation and the activity or event number, if using a CPM construction schedule.
 - b. Scheduled date for first submittal.
 - c. Specification Section number and title.
 - d. Submittal category: Action; informational.
 - e. Name of subcontractor.
 - f. Description of the Work covered.
 - g. Scheduled date for Architect's final release or approval.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for purchasing.
 - j. Scheduled dates for installation.
 - k. Activity or event number.
 - 9. If Contractor fails to submit a submittal schedule, Contractor will not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

10. Identify multiple submittals for each product/system using a capital letter sequentially as a suffix, starting with 001A.
11. Number multiple submittals within each Section sequentially as a suffix, starting with 001.

1.03 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. The Owner will review electrical and mechanical submittals and color selections.
- B. Coordinate with Owner's insurance carrier for review of necessary documents related to insurance coverage.
- C. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings may be provided by Architect for Contractor's use in preparing submittals.
 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project Record Drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings. Use of this information is at Contractor's sole risk.
 - b. Digital Drawing Software Program: The Contract Drawings are available in AutoCad.
 - c. Prior to receiving digital files, execute data licensing agreement; Architect's standard form.
 - d. The following digital data files will be furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
 2. Report to Architect discrepancies, if any, between published Contract Documents and information provided according to General Conditions and other administrative requirements of the Contract.
 3. Submittals prepared using any of these files as the primary submittal content without the inclusion of substantial additional content generated by Contractor according to specified requirements for applicable submittals will not be accepted or reviewed by Architect.
- D. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- E. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 10 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 10 working days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 10 working days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 10 working days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
 6. Submittals for the following will require a review period greater than 10 working days:
 - a. Steel.
 - b. Concrete Reinforcing.
 - c. Exterior Skin Systems (metal panels, window wall system, etc.).
 - d. Doors.
 - e. Elevators.
 - f. Waterproofing.
 - g. Metal Flashing.
 - h. Door Hardware
 7. Submittals received after 4:00pm will be recorded as received the following work day.
 8. Do not make "Mass" submittals to Architect. "Mass Submittals" are defined as eight or more submittals in four working day contiguous period or 15 or more submittals in one week. If Mass submittals are received, Architect's review time stated above will be extended as necessary to perform proper review. Architect will review Mass submittals based upon priority determined by Architect after consultation with Owner and Contractor.
- F. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Provide five copies of submittals.
 2. Indicate name of firm or entity that prepared each submittal on label or title block.
 3. Provide a space approximately 6 inches by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect .
 4. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
 5. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect .
 6. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review or discard submittals received from sources other than Contractor.
 - a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.

- 3) Destination (To:).
- 4) Source (From:).
- 5) Name and address of Architect.
- 6) Name of Contractor.
- 7) Name of firm or entity that prepared submittal.
- 8) Names of subcontractor, manufacturer, and supplier.
- 9) Category and type of submittal.
- 10) Submittal purpose and description.
- 11) Specification Section number and title.
- 12) Specification paragraph number or drawing designation and generic name for each of multiple items.
- 13) Drawing number and detail references, as appropriate.
- 14) Indication of full or partial submittal.
- 15) Transmittal number, numbered consecutively.
- 16) Submittal and transmittal distribution record.
- 17) Remarks.
- 18) Signature of transmitter.
- 19) Use blue colored paper for informational submittals; white paper for all other submittals.

G. 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., LC-061000.01). Resubmittals shall include a alphabetic suffix after another decimal point (e.g., LC-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect .
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Transmittal number, numbered consecutively.
 - p. Submittal and transmittal distribution record.
 - q. Other necessary identification.
 - r. Remarks.

H. Options: Identify options requiring selection by Architect.

- I. 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 Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- J. 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 Architect's action stamp.
- K. 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.
- L. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.04 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Post electronic submittals as PDF electronic files directly to Contractor's FTP site specifically established for Project.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 3. 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. Additional copies may be required for each type of submittal in remaining paragraphs below for projects with a construction manager or a commissioning authority.
- C. Special Submittal Restrictions:
 - 1. Submittals not requested will not be recognized or processed.
 - 2. Submittals not reviewed by Contractor will be rejected, and will not be reviewed by Architect. Claims for delay as the result of submittals not reviewed by Contractor will not be allowed.
- D. Manufacturer's Catalog Submittals: If manufacturer's published catalog information is used as part of a submittal, include only those pages from catalog that are specifically applicable to the proposed products for this Project.
 - 1. Clearly identify in the submittal those specific products and components for which review and action is requested.
 - 2. Submittals received that do not clearly identify specific applicable products, or that include more pages than those specifically applicable to the subject submittal, will be returned as "not reviewed" and the time for submittal review will not commence until a properly scoped submittal is received by Architect.
- E. 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.
- F. 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. Comply with Owner's requirements and office policy.
 - b. Identification of products.
 - c. Schedules.
 - d. Compliance with specified standards.
 - e. Notation of coordination requirements.
 - f. Notation of dimensions established by field measurement.
 - g. Relationship and attachment to adjoining construction clearly indicated.
 - h. 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 inch, but no larger than 30 inches by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
 - b. 1 opaque (bond) copies of each submittal. Architect will return no copies.
 4. BIM File Incorporation: Develop and incorporate Shop Drawing files into Building Information Model established for Project.
 - a. Prepare Shop Drawings in the same digital data software program, version, and operating system as the original Drawings.
- G. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit 3 full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return 2 submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit 6 sets of Samples. Architect will retain 3 Sample sets; remainder will be returned. Retain one returned Sample set as a project record sample on the construction site.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least 6 sets of paired units that show approximate limits of variations.
 - 3) One set of returned samples shall remain on the project site for verification of installed items.
- H. 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.
- I. Contractor's Construction Schedule: Comply with requirements specified in Section 01 3216 - Construction Progress Schedule.
- J. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 2000 - Price and Payment Procedures.
- K. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 4000 - Quality Requirements.
- L. Maintenance Data: Comply with requirements specified in Section 01 7700 - Closeout Procedures.

- M. 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.
- N. 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.
- O. 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.
- P. 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.
- Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- S. 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.
- T. 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.
- U. 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.
- V. 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.
- W. 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.
- X. 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.
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria and list of applicable codes and regulations. 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.
 - 1. Furnish separate submittal indicating complete description of loads, forces, and moments transferred to "base building" structure at each point of contact.

2. Include secondary forces resulting from connections used.
3. Do not submit engineering calculations for support reactions.
4. Submit design data bearing seal and signature of professional engineer responsible for design.

1.05 CALCULATIONS

- A. When specified in individual Sections, submit calculations.
- B. Submit engineering calculations for component sizes, deflections, and connections.
- C. Submit calculations bearing seal and signature of registered professional engineer responsible for design.
- D. Where existing conditions deviate from Contract Documents or shop drawings, submit calculations for existing condition, including calculations for anticipated corrective action required, and changes to loads transferred to "base building" structure.

1.06 INFORMATIONAL SUBMITTALS

- A. Informational submittals upon which Architect is not expected to take responsive action may be so identified in Contract Documents. When professional certification of performance criteria of materials, systems, or equipment is required by Contract Documents, Architect shall be entitled to rely upon accuracy and completeness of such certifications.
- B. Types of Informational Submittals:
 1. Design data: Submit with shop drawings.
 2. Test reports: Submit within two weeks of testing.
 3. Certifications:
 - a. Submit certifications when specified in individual Specification sections.
 - b. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - c. Certifications may be recent or previous test results on material or product, but must be acceptable to Architect.
 - d. Submit welder certifications 2 weeks prior to commencement of welding operations.
 - e. Submit manufacturer or fabricator certifications with product data.
 - f. Submit certificates of compliance within two weeks following approval or acceptance by authority having jurisdiction.
 - g. Submit installation certifications within two weeks following completion of product installation.
 4. Engineering Certifications:
 - a. Submit certified statement, signed and sealed by professional engineer responsible for design attesting to the following:
 - 1) Conformity to applicable governing codes.
 - 2) Conformity to criteria in Contract Documents.
 - 3) Component parts were designed or selected for locale and application intended.
 - b. Submit with shop drawings. Submit prior to fabrication if shop drawings are not required by individual specification sections.
 5. Qualification Data:
 - a. When specified in individual Sections, submit manufacturer's, fabricator's, and installer's qualifications verifying years of experience.
 - b. Include list of completed projects having similar scope of Work identified by name, location, date, reference names, and phone numbers.
 - c. Submit manufacturer qualification data with proposed products list.
 - d. Submit fabricator or installer qualification data with list of subcontractors at least 15 days prior to submitting first Application for Payment.
 6. Manufacturer's Instructions:
 - a. Refer to Section 01 6000 - Product Requirements for requirements.

- b. When specified in individual Specification sections, submit manufacturer's printed instructions for delivery, storage, assembly, installation, adjusting, finishing, and other pertinent data.
 - c. Identify conflicts between manufacturer's instructions and Contract Documents.
 - d. Submit with product data.
- 7. Manufacturer's Field Reports:
 - a. Refer to Section 01 4000 - Quality Requirements for requirements.
 - b. When specified in individual Specification sections, submit written results and findings of manufacturer's field services specified as part of Field Quality Control.
 - c. Submit within two weeks following completion of field services covered in individual reports.
- C. Quantity: Submit in quantities specified for product data.

1.07 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual Sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types specified.
- D. Submit for Owner's benefit during and after project completion.

1.08 INCOMPLETE AND PARTIAL SUBMITTALS

- A. Incomplete Submittal: Submittal not complying with specified submittal requirements.
- B. Partial Submittal: Submittal subdivided into components as indicated in submittal schedule and each component submitted separately.
- C. Architect will not review incomplete submittals. Complete submittals for each item are required. Submittal will not be considered official until it is complete in every respect. Delays resulting from incomplete submittals are not responsibility of Architect.

1.09 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Send original submittals to:
 - 1. H&M Company, Inc.
 - 2. 50 Security Drive, Jackson, TN 38305
 - 3. ATTN: Graham Salonus, Construction Project Manager
 - 4. Email: gsalonus@hmcompany.com.
 - 5. Office Phone: (731) 660-3178.
 - 6. Mobile Phone (731) 234-3232.
- C. Submittal Review Stamps:
 - 1. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
 - 2. Provide space for Contractor and Architect review stamps.
 - 3. Submittals not bearing Contractor's review stamp, indicating both review and approval, will not be reviewed and be returned for required review.
 - a. Apply submittal stamp to each page of submittals or each sample.
- D. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

- E. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 - Closeout Procedures.
- F. 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.

1.10 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 - 1. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 2. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
 - 3. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
 - 4. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 5. Architect will review submittals up to two times. If more than two reviews of an individual submittal are required for any reason, costs for re-review of submittals will be charged at the Architect's standard hourly rates, to Contractor, and Contract Sum will be adjusted by Change Order.
- B. Architect will review each submittal, mark it with appropriate "action," and return it to Contractor within specified time allowance; except when it must be held for coordination, and Contractor is so advised.
- C. Where submittals include materials, products, systems, or manufacturers not specified, approved by Addendum prior to execution of the Contract, or approved in writing in conjunction with the proposed products list submittal specified in Section 01 6000 - Product Requirements, Architect reserves the right to exceed the specified time allowance to allow sufficient time to determine the acceptability of such items, and no claim for delay by Contractor will be allowed.
- D. Where submittals include a material, product, system, or manufacturer substitution which has not been previously accepted or approved in writing, Architect reserves the right to reject such submittal and require a compliant submittal, or may direct that other action be taken by Contractor to achieve compliance with Contract Documents, and no claim for delay by Contractor will be allowed.
- E. Architect's review is for general conformance only and does not relieve Contractor from full compliance with the Contract Documents. Refer to General Conditions.
 - 1. Architect's review of submittals is for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. Architect's review is not conducted for purpose of determining accuracy and completeness of items such as dimensions and quantities, which remain responsibility of Contractor.
 - 2. Architect's review and approval of submittals does not relieve Contractor of responsibility for deviations from Contract Document requirements, unless Architect is informed in writing of deviations and approval is received in writing from Architect for such deviation.
 - 3. Architect's review and acceptance of submittals does not indicate acceptance of changes in Contract time or cost.
- F. Informational submittals and other similar data are for Architect's information and do not require Architect's responsive action.
- G. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. The Owner's Representative and the Architect/Engineer will retain one (1) copy of the submittal. Remaining copies will be returned to the Contractor with a "Submittal Review" stamp marked FURNISH AS SUBMITTED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM. It is intended that the Contractor submit complete and accurate shop drawing data at the first submittal. If the shop drawings or layout drawings are returned to the Contractor noted REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, only one additional submission is permitted.
2. Provide all Work in accordance with shop drawings and layout drawings stamped noted FURNISH AS SUBMITTED or FURNISH AS CORRECTED inasmuch as they are in agreement with the Contract Documents. Where differences occur between the shop drawings and layout drawings and the Contract Documents, the Contract Documents govern the Work.

1.11 DISTRIBUTION

- A. Duplicate and distribute reproductions of shop drawings, product data, samples, and other submittals which bear Architect's stamp of approval, to Project site file, subcontractors, suppliers, other affected contractors, and other entities requiring information.
- B. Provide each testing and inspection agency one set of approved submittals for their exclusive use in providing specified quality control testing and inspection services.
- C. Provide additional set of approved submittals for Project record documents file; refer to Section 01 7800 - Closeout Submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. Testing and inspection agencies and services.
- D. Contractor's construction-related professional design services.
- E. Control of installation.
- F. Tolerances.
- G. Manufacturers' field services.
- H. Defect Assessment.
- I. Basis of design specifications.

1.02 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2016.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2015a.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.
- G. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

1.03 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
 - 1. Temporary sheeting, shoring, or supports.
 - 2. Temporary scaffolding.
 - 3. Temporary bracing.
 - 4. Temporary falsework for support of spanning or arched structures.
 - 5. Temporary foundation underpinning.
 - 6. Temporary stairs or steps required for construction access only.
 - 7. Temporary hoist(s) and rigging.
 - 8. Investigation of soil conditions to support construction equipment.

1.04 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 Architect.

- 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 an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- 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.
- J. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

1.05 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date or edition is established by applicable code.
- C. Obtain copies of standards where required by product specification Sections.
 - 1. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- E. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference standard document.

1.06 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the

minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.07 SUBMITTAL REQUIREMENTS

- A. See Section 01 3300 - Submittal Procedures, for submittal procedures.
- B. Shop Drawings: For integrated exterior mock-ups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- C. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- D. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.
- E. 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 the Architect.
 - 2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.
- F. Design Data: Submit for Architect's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.
 - 1. Provide additional copies of design data for Architect's design consultants, including but not limited to structural engineer, mechanical engineer, plumbing engineer, and electrical engineer; transmit to each design consultant's address concurrently, if requested by Architect.
- G. Test Reports: After each test or inspection, testing agency will promptly submit electronic copies of report to Architect and to Contractor.
 - 1. Transmit one copy of each report to Owner, if requested.
 - 2. Provide additional copies of each test/inspection report for Architect's design consultants, including but not limited to structural engineer and electrical engineer; transmit to each design consultant's address concurrently, if requested by Architect.
 - 3. Include in content of reports:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications Section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Compliance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
 - 4. Test reports are submitted for Architect's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.
- H. Certificates: When specified in individual specification Sections, submit certification by the manufacturer and Architect or installation/application subcontractor to Architect, in quantities specified for Product Data.

1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- I. Subcontractor, Trade Contractor and Installer Qualifications: When specified in individual specification Sections, submit qualifications data substantiating specified qualifications; three copies, one of which will be reviewed and returned to Contractor indicating action taken.
- J. Manufacturer's Instructions: When specified in individual specification Sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- K. 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.
- L. 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.
- M. 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.
- N. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit report in duplicate within 30 days of observation to Architect for information.
 2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.
- O. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.08 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.
 4. For testing agencies to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Contractor's Quality Control (CQC) Plan:
1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
 - a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
 - 1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.
 - b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
 - 1) Management and control of documents and records relating to quality.
 - 2) Communications.
 - 3) Coordination procedures.
 - 4) Resource management.
 - 5) Process control.
 - 6) Inspection and testing procedures and scheduling.
 - 7) Control of noncomplying work.
 - 8) Tracking deficiencies from identification, through acceptable corrective action, and verification.
 - 9) Control of testing and measuring equipment.
 - 10) Project materials certification.
 - 11) Managerial continuity and flexibility.
 - c. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.
 - d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require Contractor to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.
- C. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

1.09 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date or edition is established by applicable code.
- C. Obtain copies of standards where required by product specification Sections.
 1. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

- E. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference standard document.

1.10 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. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. 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.
- I. 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.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mock-ups, and laboratory mock-ups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mock-ups using installers who will perform same tasks for Project.

- e. Build laboratory mock-ups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, and laboratory mock-ups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.11 QUALITY CONTROL - GENERAL

- A. Maintain quality control over subcontractors, suppliers, manufacturers, products, services, site conditions, and workmanship to produce Work of specified quality according to the requirements of the Contract Documents.
- B. Special Testing and Inspection: It is recognized that specified special testing and inspection program is intended to assist Contractor, Owner, Architect, and jurisdictional authorities in nominal determination of probable compliance with specified requirements for certain elements of the Work. This program is not intended to limit Contractor's standard quality control program.

1.12 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspection.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
 - 1. Testing Agency: Comply with requirements of ASTM E 329, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, and ASTM D 3740 as applicable.
 - 2. Inspection Agency: Comply with requirements of ASTM D3740 and ASTM E329 as applicable.
 - 3. Laboratory: Authorized to operate in the State in which the Project is located.
 - 4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
 - 5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

1.13 BASIS OF DESIGN SPECIFICATIONS

- A. Individual specification Sections may include a Basis of Design Manufacturer or Product, which forms the basis of the specifications, Drawing details, and other requirements of the Contract Documents. The specified Basis of Design Manufacturer or Product is not intended to exclude other manufacturers, products, or systems which comply with the requirements of the Contract Documents, subject to the provisions and requirements specified in individual specification Sections.
- B. Comply with the administrative requirements for substitutions specified in Section 012500 Substitution Procedures for proposed products or systems other than the specified Basis of Design Manufacturer or Product.
- C. Comply with the administrative requirements for substitutions specified in Section 6000 for proposed products or systems other than the specified Basis of Design Manufacturer or Product.

1.14 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 5 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 may also serve as Project superintendent .
- 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[, including tests and inspections indicated to be performed by the Commissioning Authority].
- E. Continuous Inspection of Workmanship: Describe process for continuous 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 and approved mock-ups.
- 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.

1.15 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.
 7. Provide test specimens representative of proposed products and construction.
 8. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 9. Provide sizes and configurations of test assemblies, mock-ups, and laboratory mock-ups to adequately demonstrate capability of products to comply with performance requirements.
 10. Build site-assembled test assemblies and mock-ups using installers who will perform same tasks for Project.
 11. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
- 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 - Interior Doors Performance Requirements.
- 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 Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority 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 quality-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, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required

1.16 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 6. Retesting and reinspecting corrected work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
 - 1. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- D. Have work performed by persons qualified to produce required and specified quality.
- E. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

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

3.04 TESTING AND INSPECTION

- A. See individual specification Sections and structural Drawings for testing and inspection required.
- B. See individual specification Sections for testing and inspection required.
- C. Testing Agency Duties:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
 - 6. Perform additional tests and inspections required by Architect.
 - 7. Submit reports of all tests/inspections specified.
- D. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- E. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 - 4. Re-testing: Performed by same agency if required because of non-conformance to specified requirements, on instructions from Architect.
 - a. Paid for by Contractor if required because of non-conformance with specified requirements.

3.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, initial installation, start-up of equipment, test, adjust and balance of equipment, and inspection of surfaces to receive waterproofing and roofing systems as applicable, and to initiate instructions when necessary.
 - 1. Manufacturer's field representative will be required to submit daily reports as specified in this Section, when daily observations and inspections are specified in individual Sections.
- B. Submit qualifications of observer to Architect minimum 30 days in advance of required observations.
 - 1. Observer subject to approval of Architect.
 - 2. Observer subject to approval of Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 TEST AND INSPECTION LOG

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

3.07 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment, with Owner's consent.

3.08 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 - Execution and Closeout Requirements.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Sustainable design-related product requirements.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 DEFINITIONS:

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material", "equipment", "system", and terms of similar intent.
- B. Named Products: Items identified by manufacturer's product name, including make or model numbers or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
- C. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
- D. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- E. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - a. Submit within 15 days after date of Notice to Proceed.
 - b. For products specified only by reference standards, list applicable reference standards.
 - 2. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
 - 3. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
 - 4. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - a. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- B. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.
- C. Substitution Requests: Refer to Section 01 2500 - Substitution Procedures.

1.04 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
- B. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
 - 1. All storage subject to approval of Construction Manager.
 - 2. Store products to allow for inspection and measurement of quantity or counting of units.
 - 3. Store materials in a manner that will not endanger Project structure.
 - 4. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 5. Store cementitious products and materials on elevated platforms.
 - 6. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 7. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 8. Protect stored products from damage and liquids from freezing.

1.06 PRODUCT WARRANTIES:

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- C. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- D. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
- E. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
- F. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- G. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures".

H. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
7. Visual Matching Specification: Where Specifications require matching and established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
8. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of products.
9. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
10. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
11. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 2 PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES:

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
- B. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
- C. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- D. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- E. Where products are accompanied by the term "as selected", Architect will make selection.
- F. Where products are accompanied by the term "match sample", sample to be matched is Architect's.
- G. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- H. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed products.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
 - 1. Made outside the United States, its territories, Canada, or Mexico.
 - 2. Made using or containing CFC's or HCFC's.
 - 3. Made of wood from newly cut old growth timber.
 - 4. Containing lead, cadmium, or asbestos.
- C. Where all other criteria are met, give preference to products that:
 - 1. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 2. Have longer documented life span under normal use.
 - 3. Result in less construction waste. See Section 01 7419 - Construction Waste Management and Disposal.
 - 4. Are made of recycled materials.
 - 5. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
 - 6. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
 - 7. Are Cradle-to-Cradle Certified.
 - 8. Have a published Environmental Product Declaration (EPD).

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- D. Products Specified by Naming a Basis of Design Manufacturer or Product with a Provision for Substitutions: Submit a request for substitution for any other manufacturer listed under Other Acceptable Manufacturers, or for a manufacturer not named.
 - 1. Refer to Section 01 4000 - Quality Requirements for basis of design specifications requirements.

2.04 COMPARABLE PRODUCTS:

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

2.05 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification Sections.
- B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Special requirements for waste management during selective demolition, renovation, and construction operations.
 - a. Protect environment, both on-site and off-site, during selective demolition, renovation, and construction operations.
 - b. Prevent environmental pollution and damage.
 - c. Monitoring requirements.
 - d. Salvaging nonhazardous demolition and construction waste.
 - e. Recycling nonhazardous demolition and construction waste.
 - f. Disposing of nonhazardous demolition and construction waste.

1.02 RELATED SECTIONS:

- A. Section 01 3000 - Administrative Requirements: Environment Manager requirements and meeting and project coordination.
- B. Section 01 8114 - Sustainable Design Requirements - CAL-Green.

1.03 WASTE MANAGEMENT REQUIREMENTS

- A. Owner desires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Owner may decide to pay for additional recycling, salvage, and/or reuse based on Landfill Alternatives Proposal specified below.
- E. Comply with CAL-Green Section 5.408 for waste management plan and 65% minimum recycling or salvage for reuse of non-hazardous construction debris or waste, unless local requirements of Authorities Having Jurisdiction are more stringent.
- F. Achieve End-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.
 - 1. Demolition Waste:
 - a. Asphalt paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.
 - d. Brick.
 - e. Concrete masonry units.
 - f. Wood studs.
 - g. Wood joists.
 - h. Plywood and oriented strand board.
 - i. Wood trim.
 - j. Structural and miscellaneous steel.
 - k. Rough hardware.
 - l. Roofing.
 - m. Insulation.
 - n. Doors and frames.
 - o. Door hardware.
 - p. Windows.

- q. Glazing.
- r. Metal studs.
- s. Gypsum board.
- t. Acoustical tile and panels.
- u. Carpet.
- v. Carpet pad.
- w. Demountable partitions.
- x. Equipment.
- y. Cabinets.
- z. Plumbing fixtures.
- aa. Piping.
- ab. Supports and hangers.
- ac. Valves.
- ad. Sprinklers.
- ae. Mechanical equipment.
- af. Refrigerants.
- ag. Electrical conduit.
- ah. Copper wiring.
- ai. Lighting fixtures.
- aj. Lamps.
- ak. Ballasts.
- al. Electrical devices.
- am. Switchgear and panelboards.
- an. Transformers.
- 2. Construction Waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Roofing.
 - g. Insulation.
 - h. Carpet and pad.
 - i. Gypsum board.
 - j. Piping.
 - k. Electrical conduit.
 - l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails
- G. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean Dimensional Wood: May be used as blocking or furring.
 - 5. Asphalt Paving: May be recycled into paving for project.

6. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 7. Glass.
 8. Gypsum drywall and plaster products.
 9. Plastic buckets.
 10. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed. Verify that specified carpet manufacturer conducts acceptable reclamation program.
 11. Paint.
 12. Plastic sheeting.
 13. Rigid foam insulation.
 14. Windows, doors, and door hardware.
 15. Plumbing fixtures.
 16. Mechanical and electrical equipment.
 17. Fluorescent lamps (light bulbs).
 18. Acoustical ceiling tile and panels.
- H. Submit monthly (with payment application) Waste Disposal Reports in the form of individual haul tickets or tipping fee receipts; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- I. Develop and follow a Waste Management Plan designed to implement these requirements.
1. Comply
- J. Methods of trash/waste disposal that are not acceptable are:
1. Burning on the project site.
 2. Burying on the project site.
 3. Dumping or burying on other property, public or private.
 4. Other illegal dumping or burying.
 5. Incineration, either on- or off-site.
- K. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.04 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
1. This definition also includes trash and waste generated by construction workers and Contractor's personnel while engaged in the work and on lunch and other breaks, including but not limited to items such as lunch bags, food wrappers, drinking cups, and similar trash and waste.
- C. Debris: Non-hazardous solid material generated during the construction, demolition, or renovation of a structure and which exceeds 2-1/2 inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.
- D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- E. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.
- F. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

- G. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- H. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- I. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- J. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- K. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- L. Return: To give back reusable items or unused products to vendors for credit.
- M. Reuse: To reuse a construction waste material in some manner on the project site.
- N. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- O. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.
- P. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- Q. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- R. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- S. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- T. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.05 SUBMITTALS

- A. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner, submit a projection of trash/waste that will require disposal and alternatives to landfilling, with net costs.
 - 1. Submit to Architect for Owner's review and approval.
 - 2. If Owner wishes to implement any cost alternatives, the Contract Sum will be adjusted as specified elsewhere.
 - 3. Include an analysis of trash/waste to be generated and landfill options as specified for Waste Management Plan described below.
 - 4. Describe as many alternatives to landfilling as possible:
 - a. List each material proposed to be salvaged, reused, or recycled.
 - b. List the proposed local market for each material.
 - c. State the estimated net cost resulting from each alternative, after subtracting revenue from sale of recycled or salvaged materials and landfill tipping fees saved due to diversion of materials from the landfill.
 - 5. Provide alternatives to landfilling for at least the following materials:
 - a. Aluminum and plastic beverage containers.
 - b. Corrugated cardboard.
 - c. Wood pallets.
 - d. Clean dimensional wood.
 - e. Land clearing debris, including brush, branches, logs, and stumps.
 - f. Concrete.
 - g. Bricks.
 - h. Asphalt paving.

- i. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - j. Glass.
 - k. Gypsum drywall and plaster.
 - l. Plastic buckets.
 - m. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (<http://flooring.dupont.com>) and Interface (www.interfaceinc.com) conduct reclamation programs.
 - n. Paint.
 - o. Rigid foam insulation.
- B. Submit Waste Management Plan within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.
- C. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 - 2. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - a. List of the recycling facilities reuse facilities, municipal solid waste landfills and other disposal area(s) to be used. Include:
 - 1) Name, location, and phone number
 - 2) Copy of permit or license for each facility
 - b. List each material proposed to be salvaged, reused, or recycled.
 - c. List the local market for each material.
 - d. State the estimated net cost, versus landfill disposal.
 - e. Identify materials that cannot be recycled or reused. Provide explanation or justification.
 - f. Revise and resubmit Plan as required by Owner.
 - 1) Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.
 - 3. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 - 4. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 - 5. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- D. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
 - 1. Submit updated Report and supporting weigh tickets with each Application for Progress Payment; failure to submit Report will delay payment.
 - 2. Submit Report on a form acceptable to Owner.
 - 3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - 4. Recycled and Salvaged Materials: Include the following information for each:

- a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
- 5. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.
- 6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.
- E. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- F. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- G. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- H. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- I. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- J. Qualification Data: For Waste Management Coordinator and refrigerant recovery technician.
- K. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- L. Recycling Incentive Programs:
 - 1. Where revenue accrues to Contractor, submit copies of documentation required to qualify for incentive.
 - 2. Where revenue accrues to Owner, submit any additional documentation required by Owner in addition to information provided in periodic Waste Disposal Report.

1.06 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 3000 - Administrative Requirements. Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.

3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN

- A. General: Develop and implement plan in accordance with ASTM E1609 consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
 1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 3. Total cost of disposal (with no waste management).
 4. Revenue from salvaged materials.
 5. Revenue from recycled materials.
 6. Savings in hauling and tipping fees by donating materials.
 7. Savings in hauling and tipping fees that are avoided.
 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
 9. Net additional cost or net savings from waste management plan.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. Refer to Section 01 6000 - Product Requirements for waste prevention requirements related to delivery, storage, and handling.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- C. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect within three days of submittal return.
- D. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- E. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Prebid meeting.
 - 2. Preconstruction meeting.
 - 3. Regular job-site meetings.
 - 4. Job safety meetings.
- F. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. As a minimum, provide:
 - a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
 - b. Separate dumpsters for each category of recyclable, if required by recycling company.
 - c. Recycling bins at worker lunch area.
 - 2. Provide containers as required.
 - 3. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 4. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
 - 5. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- G. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

3.03 RECYCLING CONSTRUCTION WASTE - GENERAL

- A. General:
 - 1. Recycle paper and beverage containers used by on-site workers.
 - 2. Handling:
 - a. Clean materials that are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - b. Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- B. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.04 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Grind asphalt to maximum 4 inch size.
 1. Crush asphaltic concrete paving and screen to comply with requirements in Division 31 Section "Earthwork" for use as general fill.
- B. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
- C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 1. Pulverize concrete to maximum 4 inch size.
 2. Crush concrete and screen to comply with requirements in Division 31 Section "Earthwork" for use as satisfactory soil for fill or subbase.
- D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 1. Pulverize masonry to maximum 4 inch size.
 - a. Crush masonry and screen to comply with requirements in Division 31 Section "Earthwork" for use as satisfactory soil for fill or subbase.
 - b. Crush masonry and screen to comply with requirements in Division 32 Section "Planting Materials" for use as mineral mulch.
 2. Clean and stack undamaged, whole masonry units on wood pallets.
- E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- F. Metals: Separate metals by type.
 1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
- H. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
 1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.
- J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- K. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- L. Plumbing Fixtures: Separate by type and size.
- M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- N. Lighting Fixtures: Separate lamps by type and protect from breakage.
- O. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- P. Conduit: Reduce conduit to straight lengths and store by type and size.

3.05 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees.
- C. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.06 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 01 7700
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. 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.

1.02 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: For each type of cleaning agent.
 - 2. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
 - 3. Certified List of Incomplete Items: Final submittal at final completion.
- B. Closeout Submittals:
 - 1. Certificates of Release: From authorities having jurisdiction.
 - 2. Certificate of Insurance: For continuing coverage.
 - 3. Field Report: For pest control inspection.
- C. Maintenance Material Submittals:
 - 1. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.03 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.
 - a. Certificate of Occupancy.
 - b. Certificate of Completion.
 - 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 Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
 - 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. Submit statement showing accounting of changes to Contract Sum.
 3. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 4. Complete startup and testing of systems and equipment.
 5. Perform preventive maintenance on equipment used prior to Substantial Completion.
 6. Advise Owner of changeover in heat and other utilities.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements, including touchup painting.
 10. 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, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect 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 Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection 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.

1.04 SUBSTANTIAL COMPLETION REVIEW

- A. When Contractor considers Work to be substantially complete, submit to Architect:
1. Written certificate that Work, or designated portion, is substantially complete.
 2. List of items to be completed or corrected (initial punch list).
- B. Within 7 days after receipt of request for Substantial Completion, Architect will make site review to determine whether Work or designated portion is substantially complete following procedures indicated in Conditions of the Contract.
- C. Should Architect determine that Work is not substantially complete:
1. Architect will promptly notify Contractor in writing, stating reasons for its opinion.
 2. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Architect.
 3. Architect will re-perform review of Work.
- D. When Architect finds that Work is substantially complete, Architect will:
1. Prepare Certificate of Substantial Completion on AIA Form G704, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Architect and Owner (final punch list). If Contractor fails to generate initial punch list, or if Architect adds more than 500 items to Contractor's list, or ten or more items per room on average, Owner will reimburse Architect for time spent in adding to or generating list, and will deduct amount of compensation from payment to Contractor.
 2. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate.
- E. After Work is substantially complete:
1. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.

2. Complete work listed for completion or correction within time period stipulated.

1.05 PREREQUISITES FOR FINAL COMPLETION

- A. Complete items in following paragraphs before requesting final acceptance and final payment. List known exceptions, if any, in request.
- B. When Contractor considers Work to be complete, submit written certification that:
 1. Contract Documents have been reviewed.
 2. Work has been examined for compliance with Contract Documents.
 3. Work has been completed in accordance with Contract Documents.
 4. Work is completed and ready for final inspection.
- C. Submit final punch list indicating all items have been completed or corrected.
- D. Submit final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
- E. Submit specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
- F. Submit updated accounting statement for final changes to Contract Sum.
- G. Submit consent of surety to final payment.
- H. Perform final cleaning for Contractor soiled areas.

1.06 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 Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. 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.
 5. Submit final completion photographic documentation.
- 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, ~~and<Owner>><<Architect>><<Construction Manager>>~~ will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.07 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

- d. Name of Contractor.
- e. Page number.
- 4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.
 - b. PDF electronic file. Architect will return annotated file.
 - c. Web-based project software upload. Utilize software feature for creating and updating list of incomplete items (punch list).
 - d. Three paper copies. Architect will return two copies.

1.08 REVISITS FOR SITE REVIEWS

- A. Should Architect have to re-perform site reviews for Substantial Completion or Final Completion due to failure of Work to comply with claims of completion made by Contractor, Owner will reimburse Architect for such additional services and will deduct amount of compensation from final payment to Contractor

1.09 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit final statement of accounting to Architect.
- B. Show adjustments to Contract Sum:
 - 1. Original Contract Sum.
 - 2. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Deductions for uncorrected Work.
 - c. Deductions for inspection payments.
 - d. Other adjustments.
 - 3. Total Contract Sum as adjusted.
 - 4. Previous payments.
 - 5. Retainage.
 - 6. Sum remaining due.
- C. Architect will prepare final Change Order reflecting approved adjustments to Contract Sum which are not included in Change Orders previously processed.

1.10 FINAL APPLICATION FOR PAYMENT

- A. Submit final Application for Payment in accordance with procedures and requirements stated in Conditions of the Contract.

1.11 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 - 1. Submit on digital media acceptable to Architect.
- E. Warranties in Paper Form:
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or

- installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 PRODUCTS

2.01 MATERIALS

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

PART 3 EXECUTION

3.01 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 1. Provide copies to Architect.
 2. Provide copies to Owner.
 3. Provide copies to Architect and Owner.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect in writing when work is considered ready for Substantial Completion.
 1. Prerequisite for Substantial Completion: In addition to definition of Substantial Completion in the General Conditions or Agreement, Substantial Completion is not considered achieved until Certificate of Occupancy is issued by primary jurisdictional authority, allowing Owner to fully occupy or utilize building and associated facilities for intended use in all respects.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Accompany Project Coordinator on Contractor's preliminary final inspection.
- H. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.02 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

- A. Submit Contractor's affidavit of Payment of Debts and Claims on AIA Document G706.
- B. Submit Contractor's affidavit of Release of Liens on AIA Document G706A with:
 1. Consent of Surety to Final Payment: AIA G707.
 2. Contractor's Release or Waiver of Liens.
- C. Separate releases or waivers of liens from subcontractors, suppliers and others with lien rights against property of Owner, together with list of those parties.
- D. Execute submittals before delivery to Owner.

3.03 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 not planted, mulched, or 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. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - p. Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - r. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 5000 - Temporary Facilities and Controls.

3.04 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, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces 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.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 01 7839
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

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

1.02 RECORD DOCUMENT REQUIREMENTS

- A. Maintain at Project site record copy of:
 - 1. Project Manual.
 - 2. Contract Drawings.
 - 3. Addenda.
 - 4. Change Orders, Change Directives, Supplemental Instructions, and other modifications to Contract.
 - 5. Approved shop drawings, product data, samples, and similar required submittals.
 - 6. Approved substitutions.
 - 7. Reports of inspection and testing agencies.
 - 8. Inspection certificates.
 - 9. Manufacturer's certificates, manufacturer's instructions, and reports of manufacturer's field observations.
 - 10. Samples.
 - 11. Other items indicated in various sections within Division 01.
- B. Obtain from Architect one electronic copy of the Drawings and Project Manual in PDF format. Make hardcopy of Contract Drawings for recording changes and modifications.
- C. Store record documents and samples in field office apart from documents used for construction. Provide files and racks for secure storage.
- D. Label and file documents and samples in accordance with section number listings in Table of Contents of Project Manual. Label each item PROJECT RECORD DOCUMENT in stamped or printed letters in prominent location on each Drawing.
- E. Maintain documents and samples in clean, dry, legible condition; do not use for construction purposes.
- F. Record information concurrently with construction progress.
- G. Make documents available for review by Architect and Owner during construction period.

1.03 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one of file prints.
 - 2) Submit record digital data files on searchable PDFs.
 - 3) Owner will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) PDF electronic files of scanned record prints.
 - 2) Record digital data files.
 - 3) Print each drawing, whether or not changes and additional information were recorded.

- B. Record Specifications: Submit three paper copies and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 PRODUCTS

2.01 RECORD DRAWINGS

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

1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
2. Format: Annotated PDF electronic file with comment function enabled and seachable.
3. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
4. Refer instances of uncertainty to Architect for resolution.
5. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. Refer to Section 01 3000 - Administrative Requirements for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.

2.02 RECORD SPECIFICATIONS

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

2.03 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file and seachable.
 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.04 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as annotated PDF electronic file and seachable.
 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE

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

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

END OF SECTION

SECTION 01 8114
SUSTAINABLE DESIGN REQUIREMENTS - CAL-GREEN

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes general requirements and procedures for achieving the most environmentally conscious Work possible within the limits of the construction schedule, contract sum, and available materials, equipment, and products for compliance with the 2016 California Green Building Standards Code (Effective January 1, 2017) and requirements of local Authorities Having Jurisdiction.
 - 1. The more stringent requirement shall apply.
- B. The General Contractor and subcontractors have an essential role; general requirements and procedures are the responsibility of the General Contractor to implement and document. Full cooperation of the General Contractor and subcontractors is essential to addressing the checklist items for application and review.
- C. Chapter 4 Residential Mandatory Measures needed to comply with CAL-Green minimum standards are dependent on material selections. Compliance with mandatory measures should be used as one underlying criterion to evaluate substitution requests.
- D. Additional mandatory measures (not dependent on material selections) needed to comply with CAL-Green are dependent on the Architect's design and other aspects of the project that are not part of the Work of the Contract.
- E. The General Contractor should be familiar with CAL-Green requirements and provide the necessary information and instruction to all subcontractors. Copies of the following referenced standards and materials should be kept on-site:

1.02 DEFINITIONS

- A. Agrifiber Products: Agrifiber products include wheatboard, strawboard, panel substrates and door cores, not including furniture, fixtures and equipment (FF&E) not considered base building elements.
- B. Building Commissioning: A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements.
- C. Composite Wood Products: A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements.
- D. MERV: Filter minimum efficiency reporting value, based on ASHRAE 52.2-2007.
- E. Product-Weighted MIR (PWMIR): The sum of all weighted-MIR for all ingredients in a product subject to this article. The PWMIR is the total product reactivity expressed to hundredths of a gram of ozone formed per gram of product (excluding container and packaging).
- F. Reactive Organic Compound: Any compound that has the potential, once emitted, to contribute to ozone formation in the troposphere.
- G. VOC: A volatile organic compound (VOC) broadly defined as a chemical compound based on carbon chains or rings with vapor pressures greater than 0.1 millimeters of mercury at room temperature. These compounds typically contain hydrogen and may contain oxygen, nitrogen and other elements. See CCR Title 17, Section 94508(a).
 - 1. Where specific regulations are cited from different agencies such as South Coast Air Quality Management District (SCAQMD), California Air Resources Board (ARB or CARB), etc., the VOC definition included in that specific regulation is the one that prevails for the specific measure in question.

1.03 REFERENCES

- A. American National Standards Institute (ANSI); 1899 L Street, NW, 11th Floor, Washington, DC 20036. Tel: (202)293-8020. Fax: (202)293-9287. <http://ansi.org>.
 - 1. NSF/ANSI 140.
- B. ASHRAE; 1791 Tullie Circle, N.E., Atlanta, GA 30329. Tel: (404)636-8400. Fax: (404)321-5478. www.ashrae.org.
 - 1. ASHRAE 52.1-1999.
 - 2. ASHRAE 52.1-1992.
- C. American Society for Testing and Materials (ASTM); 100 Bar Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959. Tel: (877)909-2786. www.astm.org.
 - 1. ASTM Standard E 1918.
 - 2. ASTM Standard C 1549.
- D. California Air Resources Board (CARB); 1001 I Street, Sacramento, CA 95814. Tel: (800)242-4450. Fax: (916)445-5025. www.arb.ca.gov.
 - 1. Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.).
- E. California Code of Regulations (CCR), Office of Administrative Law; 300 Capitol Mall, Suite 1250, Sacramento, CA 95814. Tel: (916)323-6225. Fax: (916)323-6826. www.oal.ca.gov/ccr.htm.
- F. California Building Standards Commission (CBSC); 2525 Natomas Park Drive, Suite 130, Sacramento, CA 95833. Tel: (916)263-0916. Fax: (916)263-0569. www.bsc.ca.gov.
 - 1. California Building Standards Code (Title 24, California Code of Regulations), 2016 Triennial Edition (current code).
 - a. Part 2 – California Building Code.
 - b. Part 3 – California Electrical Code.
 - c. Part 4 – California Energy Code.
 - d. Part 5 – California Plumbing Code.
 - e. Part 11 – California Green Building Standards Code.
- G. California Department of Public Health (CDPH). Tel: (916)558-1784. www.cdph.ca.gov.
 - 1. CDPH Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (CDPH Standard Method V1.1 or specification 01350).
- H. The Carpet and Rug Institute (CRI); 100 South Hamilton Street, Dalton, GA 30720. Tel: (706)278-3176. Fax: (706)278-8835. www.carpet-rug.org.
 - 1. CRI Green Label Plus Program.
- I. South Coast Air Quality Management District (SCAQMD); 21865 Copley Drive, Diamond Bar, CA 91765. Tel: (909)396-2000.
 - 1. SCAQMD Rule 1168 VOC limits.
- J. WaterSense, U.S. Environmental Protection Agency, Office of Wastewater Management (4204M), 1200 Pennsylvania Avenue, NW, Washington, DC 20460. Tel: (866)987-7367. www.epa.gov/watersense.

1.04 SUBMITTAL PROCEDURES

- A. General: Additional Sustainable Design submittal requirements are included in other sections of the Specifications.
- B. Sustainable Design submittal requirements are in addition to other submittals. If a submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated CAL-Green mandatory and voluntary measures.
- C. CAL-Green Action Plans: Provide preliminary submittals within 30 calendar days of construction start indicating how the following requirements will be met.

1. Stormwater pollution prevention plan (SWPPP) complying with Sections 4.106.2 and 5.106.1 (amended per 99.05.106.1, 99.05.106.1.1, and 99.05.106.1.2).
 2. Construction waste management plan complying with Sections 4.408.1 and 5.408.1.1, and Specification Section 01 74 19 Construction Waste Management.
 3. Indoor air quality (IAQ) plan during construction complying with Sections 5.504.1.3, 4.504.1, 5.504.3, 5.504.7 (amended per 99.05.504.7), and Specification Section 01 81 19 Indoor Air Quality Requirements.
 4. CAL-Green Report Schedule – Provide schedule for submitting progress reports for stormwater pollution prevention, construction waste management, and indoor air quality during construction.
- D. CAL-Green Reports: Reports shall be submitted to the Architect and Sustainability Consultant at no more than 90-day intervals.
1. Stormwater pollution prevention plan (SWPPP) inspection demonstrating compliance with Sections 4.106.2 and 5.106.1 (amended per 99.05.106.1, 99.05.106.1.1), and 99.05.106.1.2). Include date-stamped photos over the course of site work activities to document the prevention of pollution of stormwater runoff from construction activities through local ordinance or best management practices.
 2. Construction waste reduction progress reports demonstrating compliance with Sections 4.408.1, 5.408.1.1 through 5.408.1.3, and Specification Section 01 74 19 Construction Waste Management. Recycle and/or salvage for reuse a minimum 75 percent of nonhazardous construction and demolition waste.
 3. Excavated soil and land clearing debris reports demonstrating compliance with Section 5.408.3 and Specification Section 01 7419 Construction Waste Management. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled.
 4. Indoor air quality (IAQ) during construction progress reports demonstrating compliance with Sections 5.504.1.3, 4.504.1, 5.504.3, 5.504.7 (amended per 99.05.504.7), and Specification Section 01 5719 - Temporary Environmental Controls.
 - a. The permanent HVAC system shall only be used during construction if necessary to condition the building within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy.
 - b. At the time of rough installation and during storage on the construction site until final startup of heating, cooling, and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.
 - c. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows within the building as already prohibited by other laws or regulations.
 5. Summary of product data collected for all low-emitting materials, adhesives and sealants complying with Sections 4.504.2.1 and 5.504.4.1, paints and coatings complying with Sections 4.504.2.2 and 5.504.4.3, aerosol paints and coatings complying with Sections 4.504.2.3 and 5.504.4.3.1, carpet systems complying with Sections 4.504.3 and 5.504.4.4, resilient flooring systems complying with Sections 4.504.4 and 5.504.4.6, and composite wood products complying with Sections 4.504.5 and 5.504.4.5.
- E. CAL-Green Documentation and Verification
1. Mandatory measure, Sections 4.106.2 and 5.106.1 (amended per 99.05.106.1, 99.05.106.1.1) Stormwater pollution prevention plan.
 - a. Storm Water Pollution Prevention Plan (SWPPP).
 - b. Construction Documentation: Date-stamped photos, which show implemented measures and any corrective action that was taken.
 2. Mandatory measure, Sections 4.408.1 and 5.408.1 Construction waste management.

- a. Identify construction waste materials to be diverted from disposal.
- b. Determine if construction waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
- c. Identify diversion facilities where collected construction waste material will be taken.
- d. Specify that the amount of construction waste materials diverted shall be calculated by weight or volume, but not by both.
3. Mandatory measure, Section 5.408.3 Excavated soil and land clearing debris.
 - a. Identify excavated soil and land clearing debris to be diverted from disposal by reuse or recycling.
 - b. Determine if excavated soil and land clearing debris will be sorted on-site.
 - c. Identify reuse or recycling facilities where collected excavated soil and land clearing debris will be taken.
4. Mandatory measure, Sections 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - a. The VOC Content Verification Checklist, LADBS Form GRN 2, shall be completed and verified prior to final inspection approval.
 - b. The manufacturer's specifications showing VOC content for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
5. Mandatory measure, Sections 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - a. The VOC Content Verification Checklist, LADBS Form GRN 2, shall be completed and verified prior to final inspection approval.
 - b. The manufacturer's specification showing VOC content for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
6. Mandatory measure, Sections 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - a. The VOC Content Verification Checklist, LADBS Form GRN 2, shall be completed and verified prior to final inspection approval.
 - b. The manufacturer's specification showing VOC content for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
7. Mandatory measure, Sections 4.504.4 and 5.504.4.6 Resilient flooring systems.
 - a. The manufacturer's specification showing pollution emissions for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
8. Mandatory measure, Sections 4.504.5 and 5.504.4.5 Composite wood products.
 - a. The formaldehyde Emissions Verification Checklist, LADBS Form GRN 3, shall be completed and verified prior to final inspection approval.
 - b. The manufacturer's specification showing formaldehyde content for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 - c. Chain of custody certificates.
 - d. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, et seq).
 - e. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
 - f. Other methods acceptable to the enforcing agency.

1.05 QUALITY ASSURANCE

- A. Sustainable Design Requirements Conference: Conduct conference at the Project site. Review methods and procedures related to sustainable design requirements.

PART 2 PRODUCTS

2.01 SITE MATERIALS

- A. Mandatory measure, Sections 4.106.7 and 5.106.11 (amended per 99.04.106.7 and 99.05.106.11) Hardscape alternatives. If using light colored material as a strategy to reduce nonroof heat islands for 25% of site hardscape:
1. Use light colored materials with an initial solar reflectance value of at least .30 as determined in accordance with the American Society for Testing and Materials (ASTM) Standards E 1918 or C 1549; or
 2. Use an open-grid pavement system or pervious or permeable pavement system.

2.02 INDOOR PLUMBING FIXTURES

- A. Mandatory measure, Sections 5.303.2 Water reduction, 4.303.1 (amended per 99.04.303.1.2) and 5.303.3 (amended per 05.303.3.2) Water conserving plumbing fixtures and fittings, 4.303.1.3.2 and 5.303.3.3.2 Multiple showerheads serving one shower, and 5.303.4 (amended per 99.05.303.4) Wastewater reduction.
1. Plumbing fixtures shall meet the maximum flow rate values shown in Table 5.303.2.3.
 2. Table 5.303.2.3 **WATER REDUCTION FIXTURE FLOW RATES**

a. FIXTURE TYPE		MAXIMUM FLOW RATE
1) Kitchen faucets	psi	1.8 gpm @ 60
2) Wash fountains	(in.)/20 gpm 60 psi	1.8 rim space @
3) Metering faucets		0.20 gallons/cycle
4) Metering faucets for wash fountains		0.20 rim space (in.)/20 gpm
 3. Water closets: The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.
 4. Urinals: The effective flush volume of urinals shall not exceed 0.125 gallons per flush.
 5. Single showerheads: Showerheads shall have a maximum flow rate of not more than 2.0 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.
 6. Multiple showerheads serving one shower: When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.
 7. Residential lavatory faucets: The maximum flow rate of residential lavatory faucets shall not exceed 1.5 gallons per minute at 60 psi. The minimum flow rate of residential lavatory faucets shall not be less than 0.8 gallons per minute at 20 psi.
 8. Lavatory faucets in common and public use areas: The maximum flow rate of lavatory faucets installed in common and public use areas (outside of dwellings or sleeping units) in residential buildings shall not exceed 0.5 gallons per minute at 60 psi.
 9. Metering faucets: Metering faucets when installed in residential buildings shall not deliver more than 0.25 gallons per cycle.
 10. Kitchen faucets: The maximum flow rate of kitchen faucets shall not exceed 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above maximum flow rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

2.03 FINISH MATERIAL POLLUTANT CONTROL

- A. Mandatory measure, Sections 4.504.2.1 and 5.504.4.1 Adhesives and sealants: Adhesives, sealants, and caulks used on the Project shall meet the requirements of the following standards:
1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management

district rules where applicable or SCAQMD Rule 1168 VOC limits, as shown in Tables 4.504.1, 4.504.2, 5.504.4.1 and 5.504.4.2. Such products also shall comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

B. Tables 4.504.1 and 5.504.4.1 ADHESIVE VOC LIMIT

1.	(Less Water and Less Exempt Compounds in Grams Per Liter)		
2.	Architectural Applications	Current VOC Limit	
a.	Indoor carpet adhesives	50	
b.	Carpet pad adhesives	50	
c.	Outdoor carpet adhesives	150	
d.	Wood flooring adhesives	100	
e.	Rubber floor adhesives	60	
f.	Subfloor adhesives	50	
g.	Ceramic tile adhesives	65	
h.	VCT and asphalt tile adhesives		50
i.	Drywall and panel adhesives	50	
j.	Cove base adhesives	50	
k.	Multipurpose construction adhesives	70	
l.	Structural glazing adhesives	100	
m.	Single-ply roof membrane adhesives	250	
n.	Other adhesives not specifically listed	50	
3.	Specialty Applications		
a.	PVC welding	510	
b.	CPVC welding	490	
c.	ABS welding	325	
d.	Plastic cement welding	250	
e.	Adhesive primer for plastic	550	
f.	Contact adhesive	80	
g.	Special purpose contact adhesive	250	
h.	Structural wood membrane adhesive	140	
i.	Top and trim adhesive	250	
4.	Substrate Specific Applications		
a.	Metal to metal	30	
b.	Plastic foams	50	
c.	Porous material (except wood)	50	
d.	Wood	30	
e.	Fiberglass	80	

C. Tables 4.504.2 and 5.504.4.2 SEALANT VOC LIMIT

1.	(Less Water and Less Exempt Compounds in Grams Per Liter)		
2.	Sealants	Current VOC Limit	
a.	Architectural	250	
b.	Marine deck	760	
c.	Nonmembrane roof	300	
d.	Roadway	250	
e.	Single-ply roof membrane	450	
f.	Other	420	
3.	Sealant Primers		
a.	Architectural		
	1) Nonporous	250	
	2) Porous	775	
b.	Modified bituminous	500	
c.	Marine deck	760	

- d. Other 750
4. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.
- D. Mandatory measure, Sections 4.504.2.2 and 5.504.4.3 Paints and coatings: Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Tables 4.504.3 and 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Tables 4.504.3 and 5.504.4.3, shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat, or Nonflat-High Gloss VOC limit in Tables 4.504.3 and 5.504.4.3 shall apply.

E. Tables 4.504.3 and 5.504.4.3 **VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS**

1.	(Grams of VOC Per Liter of Coating, Less Water and Less Exempt Compounds)	
2.	Coating Category	Current Limit
a.	Flat coatings	50
b.	Nonflat coatings	100
c.	Nonflat high gloss coatings	150
3.	Specialty Coatings	
a.	Aluminum roof coatings	400
b.	Basement specialty coatings	400
c.	Bituminous roof coatings	50
d.	Bituminous roof primers	350
e.	Bond breakers	350
f.	Concrete curing compounds	350
g.	Concrete/masonry sealers	100
h.	Driveway sealers	50
i.	Dry fog coatings	150
j.	Faux finishing coatings	350
k.	Fire resistive coatings	350
l.	Floor coatings	100
m.	Form-release compounds	250
n.	Graphic arts coatings (sign paints)	500
o.	High-temperature coatings	420
p.	Industrial maintenance coatings	250
q.	Low solids coatings	120
r.	Magnesite cement coatings	450
s.	Mastic texture coatings	100
t.	Metallic pigmented coatings	500
u.	Multicolor coatings	250
v.	Pretreatment wash primers	420
w.	Primers, sealers and undercoaters	100
x.	Reactive penetrating sealers	350
y.	Recycled coatings	250
z.	Roof coatings	50
aa.	Rust preventative coatings	250
ab.	Shellacs	
1)	Clear	730
2)	Opaque	550
ac.	Specialty primers, sealers and undercoaters	350

- | | |
|---------------------------------------|-----|
| ad. Stains | 250 |
| ae. Stone consolidates | 450 |
| af. Swimming pool coatings | 340 |
| ag. Traffic marking coatings | 100 |
| ah. Tub and tile refinishing coatings | 420 |
| ai. Waterproofing membranes | 250 |
| aj. Wood coatings | 275 |
| ak. Wood preservatives | 350 |
| al. Zinc-rich primers | 340 |
- F. Mandatory measure, Sections 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings: Aerosol paints and coatings shall meet PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of California Code of Regulations, Title 17, commencing with Section 94520.
- G. Mandatory measure, Sections 4.504.4 and 5.504.4.6 Resilient flooring systems: 80% of the total area receiving resilient flooring shall comply with one or more of the following:
1. VOC emission limits defined in CHPS High Performance Products Database.
 2. Products compliance with the CHPS criteria certified under the Greenguard Children & Schools program.
 3. Certification under the Resilient Floor Covering Institute (RCFI) FloorScore program.
 4. Meet the California Department of Public Health's Specification 01350.
 5. Verification of compliance - Documentation shall be provided verifying that resilient flooring materials meet the pollutant emissions limits.
- H. Mandatory measure, Sections 4.504.5 and 5.504.4.5 Composite wood products: New hardwood plywood, particle board, and medium density fiberboard composite wood products used in the interior or exterior of the building shall meet the formaldehyde limits listed in Tables 4.504.5 and 5.504.4.5.
- I. Tables 4.504.5 5.504.4.5 **FORMALDEHYDE LIMITS**
- | | |
|--|---------------|
| 1. (Maximum Formaldehyde Emissions in Parts per Million) | |
| 2. Product | Current Limit |
| 3. Hardwood plywood veneer core | 0.05 |
| 4. Hardwood plywood composite core | 0.05 |
| 5. Particle board | 0.09 |
| 6. Medium density fiberboard | 0.11 |
| 7. Thin medium density fiberboard | 0.13 |
- J. Mandatory measure, Section 5.504.3 Filters: An air filter with a Minimum Efficiency Reporting Value (MERV) of 8 or higher shall be installed in the mechanical system for outside and return air prior to occupancy.
1. Exceptions:
 2. An ASHRAE 10-percent to 15-percent efficiency filter shall be permitted for an HVAC unit meeting the 2016 California Energy Code having 60,000 Btu/h or less capacity per fan coil, if the energy use of the air delivery system is 0.4 w/cfm or less at design air flow.
 3. Existing mechanical equipment.

PART 3 EXECUTION

3.01 CONSTRUCTION WASTE MANAGEMENT

- A. Mandatory measure, Sections 4.408.1 and 5.408.1 Construction waste management, comply with Specification Section 01 74 19 Construction Waste Management.

3.02 COMMISSIONING

- A. Mandatory measure, Sections 5.410.2 (amended per 99.05.410.2.5.1) Commissioning, comply with Specification Section 01 91 13 General Commissioning Requirements.

3.03 INDOOR AIR QUALITY (IAQ) DURING CONSTRUCTION

- A. Mandatory measures, Sections 5.504.1.3, 4.504.1, 5.504.3, 5.504.7 (amended per 99.05.504.7), comply with Specification Section 01 81 19 Indoor Air Quality Requirements.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

- A. Scope of work included under this Section of the Specifications, consists of, but is not necessarily limited to, following work elements as shown and detailed on drawings and/or as hereinafter specified:
 - 1. Fine grading of concrete floor slab sub-grades.
 - 2. Supply, fabrication and placement of all reinforcing steel required by drawings for reinforced concrete construction.
 - 3. Setting and anchoring of all miscellaneous steel items required by drawings to be embedded in concrete construction.
 - 4. Construction of reinforced concrete equipment housekeeping pads and miscellaneous concrete structures as shown on drawings.
 - 5. Installation of concrete to fill inside of bollards.
- B. Applicable provisions of the General Conditions and Division 1 of the Technical Specifications are included in the scope of this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

1.03 CODES AND STANDARDS:

- A. All work required under this Section of the Specifications, shall be performed in accordance with applicable portions of following ACI, ASTM, and CRSI Standards.
 - 1. ACI 301; Latest Edition: "Specifications for Structural Concrete".
 - 2. ACI 302; Latest Edition: "Guide for Concrete Floor and Slab Construction".
 - 3. ACI 304 Latest Edition: "Guide for Measuring, Mixing, Transporting and Placing Concrete".
 - 4. ACI 305; Latest Edition: "Hot Weather Concreting".
 - 5. ACI 306; Latest Edition: "Cold Weather Concreting".
 - 6. ACI 318; Latest Edition: "Building Code Requirements for Structural Concrete".
 - 7. ACI 347; Latest Edition: "Guide to Formwork for Concrete".
 - 8. ACI SP-66(04); Latest Edition: "Details and Detailing of Concrete Reinforcement".
 - 9. CRSI (DA 4); Latest Edition: "Manual of Standard Practice".
 - 10. CRSI (P1); Latest Edition: "Placing Reinforcing Bars".

1.04 FIELD QUALITY CONTROL:

- A. Sampling: Comply with requirements of ASTM C172, AND ASTM C94.
- B. Slump: Comply with requirements of ASTM C143. Make slump tests for each concrete load at point of discharge and an additional test for each set of compressive strength test specimens. In the event that measured slump is outside specified limits, another test shall be made on a portion of same sample. In the event of a second failure, concrete shall be rejected.
- C. Air Content: Comply with requirements of ASTM C231, Pressure Method. Perform one test for each set of compressive strength test specimens. Test another portion of same sample if measured content in concrete falls outside of specified limits. In the event of a second failure, concrete shall be rejected.
- D. Compressive Strength: Cast and field cure one (1) set of four (4) cylinders for each Concrete Class placed in any one day. One (1) test required for each 50 cu. yd. or fraction thereof poured (at the discretion of the Engineer this frequency can be increased to one (1) test per 100 cu. yd. for floor slab construction). Testing to comply with ASTM C39. One specimen shall be tested at 7 days, two specimens tested at 28 days. The remaining specimen shall be held in reserve for future testing. In the event that the average of two, 28-day compressive strength tests fall below specified strength. Contractor shall be required to rework or replace defective concrete as directed by the Engineer.

- E. Submit test result reports (via fax or email) to Owner, Engineer and Contractor. Reports of compressive strength tests shall contain project identification name and number, date of concrete placement, name of Contractor, name of Concrete Supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, slump and air content. **Failing tests shall be reported immediately.**
- F. Concrete Temperature: Comply with ASTM C1064; one test hourly when temperature is below 40°F and when temperature is above 80°F.
- G. Pre-installation Conference: Schedule conference at site sufficiently before floor slab construction to ensure that all quality control measures are in place.
 - 1. Agenda for this pre-installation conference shall include the following:
 - a. Review concrete mix design and procedures for ensuring quality of concrete materials.
 - b. Review floor subgrade requirements and examine subgrade for compliance with specifications.
 - c. Confirm requirements for fine grading
 - d. Review floor joint design.
 - e. Review concrete testing requirements.
 - f. Review reinforcing steel placement.
 - g. Review floor slab finish, curing and surface treatments.
 - h. Review special quality concerns.
 - 2. As a minimum the following persons shall attend this conference:
 - a. Testing laboratory representative
 - b. Ready mix concrete supplier
 - c. Floor treatment representative
 - d. Floor finisher
 - e. General contractor superintendent
 - f. General contractor project manager
 - g. Engineering project manager
 - h. Owner's representative
- H. Tests not specifically indicated to be performed at Owner's expense, including retesting of rejected materials and installed work, shall be performed at Contractor's expense.

1.05 QUALIFICATIONS:

- A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- C. Testing Agency Qualifications: An independent testing agency retained by the Owner, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 and capable of performing special inspections per the governing building code and as noted on the drawings.

1.06 SUBMITTALS:

- A. Manufactured Products: Submit for review and approval, two copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, water stops, floor hardeners and similar materials specified in this Section of the Specifications.
- B. Design Mixture Constituents: Provide for each concrete mixture. Data shall include types of aggregates, gradations of aggregates, type of cement and flyash, and source of cement and flyash.

- C. Shop Drawings - Concrete Reinforcement: Submit shop drawings for fabrication, bending and placement of concrete reinforcement when specifically requested by the Engineer. These drawings shall be prepared in accordance with ACI Standard 315; Include bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcements, and special reinforcement requirements at openings through concrete structures. Engineer's approval of these shop drawings shall be obtained prior to fabrication.

1.07 CONCRETE MIX DESIGNS:

- A. Ready-Mix Concrete shall only be supplied from an approved source, meeting requirements of ASTM C94, Latest Edition. Prior to placement of concrete, Contractor shall submit mix design for each strength and type of concrete to Engineer for approval.
- B. Supply proposed mix designs and supporting data for approval for each strength and / or type of concrete prior to placement of concrete. Mix design shall include weights of each constituent (aggregates, cement, flyash, water, and admixtures). Indicate amounts of mixing water to be withheld. Each truckload of concrete delivered to the project shall be provided with a mix ticket that also indicates the maximum amount of water available for possible addition at the project site.
- C. Supporting data provided with the mix designs submitted for review shall include recent compressive strength test results for the particular mix design submitted. When maximum shrinkage is specified, test results verifying shrinkage for the particular mix shall also be submitted.
- D. Mix designs shall be developed to provide consistent minimum 28-day compressive strengths as noted below. Concrete mixes to comply with the following requirements:
1. Outside Concrete Slabs, Sidewalks, Ramps, Stairs, Drainage Structures Etc., - Minimum 4,000 Psi, U.N.O. on drawings:
 - a. Water Cement Ratio: .47 Maximum
 - b. Cement Factor: Minimum 564 lb./cu.yd.
 - c. Air Entrainment: 3 % (+/- 1%)
 - d. Water Reducing Agent: Per Manufacturer's Recommendation
 - e. Slump: 5" Maximum
 - f. Aggregate: Local Sand & Coarse Aggregate (size #57)
 2. Floor Slabs On-Grade and Structural Slabs – Minimum 4,000 Psi:
 - a. Water Cement Ratio: .50 Maximum
 - b. Cement Factor: Minimum 517 lbs./cu.yd.
 - c. Air Entrainment: Normal (no admixture)
 - d. Water Reducing Agent: As Required
 - e. Slump: 5" Maximum
 - f. Aggregate: Local Sand & Limestone Coarse Aggregate Size 467
 - g. Shrinkage: 0.03% max. at 28 days (test per ASTM C157)
 3. Lean Concrete Fill Material – Based on 1 CY of Material:
 - a. Type I Portland Cement: 250 lbs
 - b. Coarse Aggregate: 1,750 lbs
 - c. Sand Aggregate: 1,700 lbs
 - d. Water: 230 lbs
 - e. Fly ash meeting ASTM C-618 may be substituted for cement in the concrete mix designs. Fly ash content shall not exceed 25% of the total weight of cement indicated in the mix designs.

PART 2 - PRODUCTS:

2.01 FINE GRADING MATERIAL:

- A. Sand applied to a maximum depth of approximately 1". Sand shall comply with following gradation requirements:
1. Percent Passing a #4 Sieve - 90-100%
 2. Percent Passing a #50 Sieve - 0-20%

3. Percent Passing a #200 Sieve - 0-10%

2.02 FORM MATERIALS AND ACCESSORIES:

- A. General: Materials and Accessories to conform to requirements of ACI 347-04, Latest Edition, Chapter 3, "Guide to Formwork for Concrete".
1. Plywood: Softwood plywood, Exterior Type, complying with requirements ACI 347. Furnish plywood sheets in maximum practical size.
 2. Floor Slab Forms: Floor slab edge forms or bulkheads shall be fabricated of lumber with nominal thickness not less than 2" and of height required to attain floor slab thickness shown on drawings. Joints shall be flush type with load transfer dowels as required by drawings.
 3. Accessories: Ties, anchors and hangers shall have minimum design capacities as tabulated in Table 1.3.1 of ACI 347. Accessories shall be proprietary items and specifically recommended by manufacturer for the application. Non fabricated wire will not be acceptable. Portions of accessories in contact with formwork shall be manufactured of galvanized metal or plastic materials.

2.03 CEMENT:

Portland cement, conforming to ASTM Specification C-150, Latest Edition; Type I or Type II.

2.04 FLY ASH ADDITIVE:

Class "C" Fly Ash conforming to ASTM Specification C-618-08.

2.05 COARSE AGGREGATE:

Clean, hard, durable, uncoated crushed stone conforming to ASTM C33, Latest Edition, "Specifications for Concrete Aggregate". Size of coarse aggregate shall be 1", with gradation as specified in ASTM C33, Table II, Size 57, except floor slab concrete coarse aggregate shall be size 467. Size as noted under Section 1.07 "Concrete Mix Designs".

2.06 FINE AGGREGATE:

Clean, hard, durable, uncoated grains of sand, conforming to ASTM C33; Latest Edition, "Specifications for Concrete Aggregate".

2.07 READY-MIX CONCRETE:

Mixture of cement, aggregate, water and additives remote from the project site, with all mixing and conveying in accordance with ASTM C94; Latest Edition.

2.08 REINFORCING STEEL AND ACCESSORIES:

- A. Reinforcing Steel: Deformed, billet-steel bars, conforming to requirements of ASTM A615, Latest Edition, 60,000 yield strength, unless otherwise noted on drawings.
- B. Wire Fabric Reinforcement: Electrically-welded wire fabric of cold drawn wire, with gauge and mesh size as shown on drawings and conforming to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement", ASTM A1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete, Latest Edition.
- C. Tie Bars: Deformed, steel bars, conforming to requirements of ASTM A615, Latest Edition, 60,000 yield strength, except that structural-grade steel bars only shall be used where tie bars are to be bent and re-straightened.
- D. Round Load-Transfer Dowels: Plain round bars, conforming to requirements of ASTM A36, Latest Edition. Dowel bars shall be saw cut and not be burred, roughened or deformed out of round in such a manner as to affect slippage in concrete.
- E. Chairs: Provide as required to hold reinforcing steel in correct position while concrete is being placed. These chairs shall be metal, minimum 16 ga. thickness, and a minimum of 11" in length x 1-1/8" in width. Tips of legs in contact with soils shall be plastic coated. Soil conditions may require chairs to be furnished with a metal base plate. Plastic chairs may be used if approved by Engineer of Record.

- F. Stakes: Provide for support of expansion joint fillers. These stakes shall be channel or "U" shaped metal, 3/4" wide x 3/8" deep and not less than 16 ga. thickness. These stakes shall be a minimum of 15" in length.

2.09 WATERSTOPS (IF REQUIRED):

Provide where required by the drawings. Waterstops shall be polyvinyl chloride, meeting the requirements of Corps of Engineers Standard CRD C-572; Latest Edition. Waterstops shall be serrated type with center bulb, 9" long: "Durajoint" Type 8 or approved equal.

2.10 JOINT FILLER:

- A. Floor Slab Control and Construction Joints: Fill control joints where indicated on the drawings to full depth of saw-cut with specified filler. Fill construction joints with fine sand to depth of 2". Fill remainder of joint with specified filler. Filler shall be "MM-80" by Metzger/McGuire Semi-Rigid Epoxy Filler, "EUCO 700" by Euclid Chemical, or approved equal.
- B. Outside Slab, Pavement and Sidewalk Construction and Control Joints: Fill all exterior concrete slab joints. A two-component polyurethane sealant, meeting requirements of Federal Specification TT-S-00227C, Type 1. Sealant shall be "Eucolastic II" by The Euclid Chemical Company, "THC-901" by Tremco, or "Duraseal-U" by W. R. Grace Company, Traffic Grade or approved equal. All joints in outside slabs shall be filled with specified filler

2.11 EXPANSION/ISOLATION JOINT MATERIAL:

Provide in thicknesses and at locations shown on drawings. Material shall be premolded, bituminous, impregnated fiber board, non-extruding and resilient type, conforming to ASTM D1751, Latest Edition.

2.12 AIR ENTRAINING ADMIXTURES:

Provide as required to meet mix design criteria. This admixture shall conform to ASTM Specification C260; Latest Edition.

2.13 ACCELERATING, RETARDING AND/OR WATER REDUCING ADMIXTURES:

Provide as required to attain mix design requirements and/or to ensure proper curing and finishing of concrete. These admixtures shall not be used without specific approval of Engineer. These admixtures shall conform to ASTM C494, Latest Edition.

2.14 CURING SHEETS:

Polyethylene film, .006" thick, clear, conforming to ASTM C171, latest Edition. For use in wet curing floor slabs.

2.15 CURING COMPOUNDS:

- A. Liquid membrane material, meeting requirements of ASTM 309, minimum solids content 18%. Compound shall be transparent, quick drying, liquid polymer, designed to both cure and seal floor slabs.
- B. For curing outside pavements, ramps, etc., curing compound shall be white, pigmented compound, complying with requirements of ASTM C309, Type II, Class B.

2.16 CHEMICAL HARDENER DENSIFIER (DUST PROOFING):

For interior slabs chemical hardener shall be "Ashford Formula" by Curecrete Distribution Inc., or equal. Compound shall be colorless water-based chemically reactive penetrating sealer/concrete hardener and dust proofer.

2.17 GROUT:

Provide under column bases and at other locations shown on drawings. Grout shall be a factory prepared mixture of non air-entraining Portland cement, well graded, sharp silica sand and other admixtures as required to produce a non-shrink grout conforming to the requirements of ASTM C1107. Grout shall be "NS Grout" by The Euclid Chemical Co., "Five Star Grout" by U.S. Grout Corp., or "Masterflow 713" by BASF, Master Builders Company, "Embeco" or approved equal. Mixing of grout shall be in accordance with manufacturer's recommendations. Minimum 5000 psi non-shrink grout.

2.18 PERIMETER INSULATION:

Where indicated on the drawings, 1" thick, rigid, closed cell, expanded polystyrene insulation board with an integral high density skin; complying with FS-HH-I-54, Type II, Class "B"; 40 psi compressive strength; .6 perm -in. maximum vapor transmission; .7% maximum water absorption; thermal conductivity ("K" value at 75°F) of .20. Insulation shall be Dow Styrofoam "SM" or equal.

PART 3 - EXECUTION:

3.01 FORMWORK:

Design and construction of formwork shall comply with ACI 347, "Recommended Practice for Concrete Formwork".

3.02 REINFORCING STEEL AND ACCESSORIES:

All details of concrete reinforcement required under this Section of the Specifications shall be in accordance with "Building Code Requirements for Reinforced Concrete", ACI 318, "Building Code Requirements for Structural Concrete", ACI 315 and "Details and Detailing of Concrete Reinforcement".

3.03 JOINTS:

- A. Construction Joints: Vertical construction joints in foundation and retaining walls shall be keyway type. Reinforcing steel shall extend through joints. Construction joints shall coincide with joints in exterior masonry or concrete walls.
 - 1. Construction joints in floor slabs on-grade shall be flush type, with dowels as detailed on the drawings. Joints shall be constructed in accordance with details shown on drawings.
 - 2. Maximum curvature at construction joints shall be as follows:
 - 3. The 24-inch curvature (value "q" as defined in ASTM E1155) shall not exceed 0.150 inch at any construction joint.
 - 4. The Testing Agency shall measure the 24-inch curvature with a Dipstick floor profiler or other instrument acceptable to the Engineers. The lab shall measure at right angles to the joint, and make at least one measurement for each 20 feet of joint length. The curvature of joints shall be measured within 72 hours of placing the second slab at the joint
- B. CONTROL JOINTS: Vertical control joints shall be placed at column lines and/or at intervals not exceeding 25 ft. or as detailed on the drawings. Joints shall further coincide with control joints provided in exterior masonry or concrete construction where applicable.
 - 1. Control joints in floor slabs shall be saw-cut with a soft-cut saw. Joints shall be 1/8" wide x 3/4" deep in 6" and thinner slabs and 1/8" x 1-1/4" deep in the slabs thicker than 6".
 - 2. Sawing of control joints shall begin as soon as slabs have sufficiently cured so that no dislodging of aggregate occurs during sawing operations. Sawing shall normally begin immediately following slab finishing.
 - 3. Spacing of control joints and/or construction joints in slabs on-grade shall not exceed dimensions indicated on the drawings. A saw cut plan must be submitted for approval by the engineer prior to slab on grade construction.
- C. ISOLATION JOINTS:

Isolation joints shall be provided where indicated on the drawings. There shall be no connections across these joints by reinforcement, keyways or bonds. Isolation joint material shall be 1/4" thick x full depth of slab unless otherwise noted on drawings. Final design of isolation joint at column block outs may not require the 1/4" exp. joint material but only a bond breaker. Refer to Floor Slab Design Drawings.

3.04 JOINT FILLING:

- A. All joints in outside slabs shall be filled as soon as practicable after construction.
- B. Joints in slabs and pavements (control and construction) shall be cleaned of all loose material, oil, grease and dirt. Thoroughly soak area with water the day before placing, leaving surface damp.

- C. Insert filler rod in joints to depth required to provide a maximum cavity depth of 1/2" for filler material. Filler material shall be applied in accordance with manufacturer's recommendations. Joints shall be completely filled and top surface of joint shall be smoothly finished to blend with adjacent concrete.
- D. Joints in interior floor slabs that are exposed to lift truck traffic shall be filled.
- E. Joints in interior floor slabs shall be filled with the specified materials in accordance with the manufacturer's instructions. Prior to filling, joints shall be free of dirt and debris. Joint fillers shall be applied when the ambient temperature is 50°F or above. Joint filler must be flush with adjacent concrete surfaces. Concave joints are not acceptable.
- F. Installation shall not proceed until the slab has cured for a minimum of 60 days.
- G. Filler shall be installed full joint depth in saw-cut control joints. Construction joints shall be filled to within 2" of floor surface with sand and remainder of joint filled with specified filler. Filler shall be finished flush with the floor surface.

3.05 EMBEDDED ITEMS:

Install anchor bolts, inserts, plates, angles, sleeves, nailing blocks, and other embedded items, whether furnished under this Section, under other Sections, or under other contracts, using suitable tem-plates to accurately set and support such items against displacement. Work to comply with requirements of ACI 301.

3.06 WATERSTOPS:

Provide where indicated on the drawings in the maximum practical length to avoid joints or splices. Tie waterstop flanges to reinfor-cement to avoid deformation due to impact of falling concrete. Install at locations indicated on the drawings in accordance with the manufac-turer's instructions and/or recommenda-tions.

3.07 CONCRETE MIXING:

- A. Mix and transport concrete in accordance with ACI 304R-00: "Guide for Measuring, Mixing and Placing Concrete".
- B. Incorporate color additive in batching and mixing of concrete in strict compliance with manufacturer's recommendations.

3.08 CONCRETE PLACING:

- A. Convey, place and consolidate concrete in accordance with applicable recommen-dations outlined in ACI 304R, "Guide for Measuring, Mixing and Placing Concrete" and ACI 301 Section B.
- B. **Employ internal vibrators to consolidate concrete in walls and at edges of floor slabs on-grade.**

3.09 COLD WEATHER CONCRETING:

- A. Temperature of as placed concrete shall not be less than 55°F. Do not place concrete when air temperature is less than 32°F. or temperature is expected to fall below 25°F. within 24 hours after placement.
- B. Make provisions for the protection of "as-placed" concrete from freezing. Maintain protection for a period of not less than 3 days by covering concrete with canvas, straw, insulating blankets or other materials as required to conserve heat of hydration. Provide protection in accordance with recommendations of Chapter 7, ACI 306R-88.
- C. Use of calcium chloride and/or other accelerators to minimize protection time shall not be permitted without specific approval in writing from Engineer.
- D. Cure cast-in-place concrete during cold weather in accordance with applicable provisions of ACI 306R-88.

3.10 HOT WEATHER CONCRETING:

- A. Concrete shall not be placed if temperature of concrete cannot be maintained at 90°F. or lower. To achieve this maximum concrete temperature, Contractor shall mix, place, finish, protect and cure concrete in accordance with provisions of ACI 305R-99.
- B. Use of admixtures to retard concrete hardening shall not be permitted without specific approval of Engineer.

3.11 REPAIR OF SURFACE DEFECTS:

Patch tie holes, honeycombed surfaces and all other defective areas immediately after form removal. Perform repair work in accordance with applicable requirements of ACI 301-09.

3.12 FINISHING FORMED SURFACES:

After removal of forms, all concrete exposed to view shall be provided with Smooth Rubbed Finish. Comply with requirements of ACI 301-09.

3.13 FLOOR SLAB SUBGRADE PREPARATION:

- A. General: Subgrade shall be prepared and constructed in accordance with ACI 302.1R-04: "Guide for Concrete Floor and Slab Construction", and as hereinafter specified.
- B. Crushed stone base shall be prepared, constructed and maintained in accordance with requirements specified in Section 02511 of this specification.
- C. Fine Grading: Proof-roll subgrade immediately prior to fine grading operation. All soft or unstable material detected during proof-rolling shall be cut out and area reworked to provide the specified density.
- D. After proof-rolling, fine grade with specified materials, formed sections as required to obtain specified slab thickness within a tolerance of plus or minus 1/4". All ruts and depressions shall be filled to eliminate any abrupt changes in floor slab thickness.

3.14 FLOOR SLAB ON-GRADE PLACEMENT AND FINISHING:

- A. General: Comply with requirements of ACI 302.1R-04: "Guide for Concrete Floor and Slab Construction",
- B. Reinforcing Steel: Reinforcing steel shall be set on metal chairs. Chairs shall be spaced on 48" center and shall be of height to ensure that reinforcement is located 2" from top surface. Reinforcing steel shall be cut at construction joints, isolation joints, and expansion joints. Reinforcing steel shall be continuous through saw cut contraction joints but steel length shall not exceed 200'-0".
- C. Construction joints, control joints, isolation joints and expansion joints shall be provided and constructed as previously specified. Immediately after saw cutting of control joints, Contractor shall apply curing compound to concrete surfaces on both sides of joint. Relief control joints to be cut at column lines. Intermediate control joints to be provided immediately after construction of relief joints.
- D. Edges of slabs shall be stoned to remove sharp edges prior to construction of adjoining slabs. Bond breaker shall be applied to concrete surface of construction joint prior to pouring adjacent slabs.
- E. Round load transfer dowels at construction joints shall be removed from joint just prior to setting of concrete. Hole in edge of slab left by removed dowel shall be smoothed by several in-out motions with dowel. Immediately prior to pouring of adjacent slabs, dowels shall be cleaned and inserted in edge of previously cast slab. Dowels shall be level, aligned and greased.
- F. Consolidation and Finishing:
 - 1. Placement: Concrete shall be discharged as close to its final position as possible.
 - 2. Screeding: Screed surface with laser screed or vibrating screed. Fill low spots with additional concrete placed by shovel and rescreed. Complete screeding before any excess water or bleeding water is present on surface of concrete.

3. Straightening: Immediately after screeding and before any excess moisture or bleeding water is present on surface of concrete, surfaces shall be straightened with a highway type straightedges to eliminate ridges and fill in voids left by screeding operations to extent required to achieve flatness and levelness.
4. Edging: After all bleeding water and excess moisture have been removed from surface, floor slab edges shall be tooled with a stainless steel edging tool formed to provide a 1/8" radiused edge.
5. Floating: Concrete shall be floated after it has stiffened to the point where foot pressure can be sustained with a maximum of 1/4" indentation. Floating shall be performed, utilizing power floats or trowelling machines fitted with float shoes. Surfaces inaccessible to power driven machines shall be hand floated, utilizing wood, magnesium or aluminum hand floats.
6. Trowelling: After floating, floor slab surfaces shall be steel trowelled to produce a smooth, dense, wear resistant concrete surface, free of trowel marks and other irregularities and finished to plane within specified tolerance. Trowelling shall be continued until surface has a dense, smooth, polished "burnt" finish. Hand trowelling shall be required at edges of floor slabs, around building columns and at other surface interruptions.
7. **Floor slabs shall not be opened to vehicular traffic for a minimum of seven (7) days or until compression tests indicate a compressing strength of 3,000 psi.**
8. A minimum of 3 power trowellings shall be provided (Ref. ACI 302 - Class 6 floors).

3.15 OUTSIDE CONCRETE WORK:

- A. Outside flatwork shall be constructed to elevations shown on drawings and shall comply with following requirements:
 1. Where specific elevations are not shown, surfaces shall slope at a rate of 1/4"/foot to a point of natural run-off.
 2. Flatness and levelness tolerance (FF, FL) shall be as specified on the drawings.
 3. Finishing requirements for outside flatwork shall be as specified for finishing interior floor slabs; except that finishing shall be limited to power floating, followed by a light-to-medium brooming or at contractor's option, a pan finish.
 4. Outside flatwork subgrade shall be prepared in accordance with requirements specified for floor slab subgrade preparation.
 5. Control joints in outside flatwork shall be saw-cut type and provided at maximum intervals of 15 ft. Joints shall be constructed with conventional saw in accordance with requirements previously specified.
 6. Expansion joints shall be provided at intersections of outside flatwork with building walls, pavements, etc. Joints shall be 3/4" thick x full depth of slab, employing premolded expansion joint material. Expansion joints exposed to traffic shall be reinforced with load transfer dowels or with thickened edges.
 7. Construction joints in outside slabs shall be flush type with load transfer dowels. Load transfer dowels shall be greased, leveled and aligned prior to construction of adjacent slabs. Construction joints shall be constructed in accordance with details shown on drawings and as specified for floor slab construction joints.
 8. All joints in outside flatwork shall be filled with specified sealant materials in accordance with requirement previously specified.
 9. Sidewalk control joints shall be tooled at intervals equal to width of sidewalk. Expansion joints (1/2" wide) shall be provided at 30' intervals. Isolation joints (1/4" wide) shall be provided at intersections of sidewalk with other structures. Exposed edges of sidewalks shall be provided with 1/4" radius.
- B. Miscellaneous concrete structures and equipment foundations/pits shall be constructed in accordance with details shown on drawings and in accordance with requirements previously specified.

3.16 GROUTING:

- A. Contractor shall grout all building column base plates and beam bearing plates. Grout shall be placed under bearing surfaces after they have been leveled. Grout shall completely fill space

so as to give a full and even bearing. This grout shall be mixed and applied in accordance with manufacturer's printed instructions.

3.17 CURING:

- A. Floor slabs not requiring special coatings shall be cured with specified membrane curing compounds. Curing compound shall be applied within 1/2 hour after completion of finishing operations and/or immediately after disappearance of "sheen" of surface moisture. Floor slab surfaces shall be uniformly coated at rate recommended by manufacturer. Application of material shall be by means of a roller or spray gun.
- B. Floor slabs receiving special coatings shall be cured as specified with strippable curing compound or by moist curing.
- C. Wall forms in contact with concrete during curing period shall be kept wet. If forms are removed during curing period, cover surface with specified curing sheets to retain moisture in wall. Remove curing sheets and wet surface during curing period (7 days). Replace cover after each wetting.
- D. Outside concrete stairs and miscellaneous concrete structures shall be cured with non-staining, resin base curing compound applied in accordance with manufacturer's recommendations.

3.18 CHEMICAL HARDENER DENSIFIER:

- A. Floor slabs not requiring special coatings shall receive specified chemical hardener.
- B. Floor slab surfaces shall be cleaned by sweeping. After sweeping, floor shall be detergent cleaned with power scrubbers until all dirt, oil and greases have been removed.
- C. Do not apply chemical hardener until concrete has cured the number of days recommended in manufacturer's instructions.
- D. Apply chemical hardener at the rate and in accordance with manufacturer's recommendations. Application of material shall be by means of a roller or spray gun.

3.19 CLEANING OF FLOOR SLABS:

- A. At the conclusion of the project, floor slab surfaces shall be cleaned by sweeping. After sweeping, floor shall be detergent cleaned with power scrubbers until all dirt, oil and greases have been removed.

END OF SECTION

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud interior wall framing.
- B. Metal framing for exterior truck dock canopies.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking and miscellaneous framing.
- B. Section 07 2100 - Thermal Insulation: Insulation within framing members.
- C. Section 07 6200 - Sheet Metal Flashing and Trim: Head and sill flashings.
- D. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.
- E. Section 09 5100 - Acoustical Ceilings: Ceiling suspension system.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- D. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2018.
- E. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a (Reapproved 2015).
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- G. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.
- B. Preinstallation Conference: Conduct conference at Project site.

1.05 SUBMITTALS

- A. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.
- B. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Indicate stud and roof truss layout.
 - 2. Describe method for securing studs to tracks and for bolted framing connections.
 - 3. Design data:
 - a. Shop drawings signed and sealed by a professional structural engineer.
- C. Delegated-Design Submittal: For cold-formed steel framing.
 - 1. Calculations shall be signed and sealed by a licensed Professional Structural Engineer in State in which project is located. A copy of the calculations shall be kept on file by the truss fabricator.
 - 2. Shop drawings shall be prepared under the direct supervision of a licensed Professional Structural Engineer in State in which project is located.

3. Submit Shop Drawings and Calculations within 30 working days of Contract date.
- D. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
 1. Steel sheet.
 2. Expansion anchors.
 3. Power-actuated anchors.
 4. Mechanical fasteners.
 5. Vertical deflection clips.
 6. Horizontal drift deflection clips
 7. Miscellaneous structural clips and accessories.
- E. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
- F. Product Certificates: For each type of code-compliance certification for studs and tracks.
- G. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.
- H. Designer's Qualification Statement.
- I. Manufacturer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.
- D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- E. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.
- F. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.07 DELIVERY, STORAGE, AND HANDLING:

- A. Section 01 6000 - Product Requirements: Transport, handle, store, and protect products.
- B. Protect metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- C. Store and protect with waterproof covering; ventilate to avoid condensation.
- D. Where framing is stored outdoors, stack materials off ground, supported on level platform, fully protected from weather.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 1. Design Loads: As indicated on Drawings.

2. Deflection Limits: Design framing systems to withstand[design loads] without deflections greater than the following:
 - a. Component deflection limits in first seven subparagraphs below are examples only. Retain deflection limits in applicable subparagraphs, or insert other limits as appropriate for wall, floor, and ceiling finish materials.
 - b. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height.
 - c. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft. (239 Pa).
 - d. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height.
 - e. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft. (239 Pa).
 - f. Floor Joist Framing: Vertical deflection of 1/360 for live loads and 1/240 for total loads of the span.
 - g. Roof Rafter Framing: Vertical deflection of 1/120 of the horizontally projected span for live loads.
 - h. Ceiling Joist Framing: Vertical deflection of 1/120 of the span for live loads and 1/240 for total loads of the span.
 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1 inch.
 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- B. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
1. Floor and Roof Systems: AISI S210.
 2. Wall Studs: AISI S211.
 3. Headers: AISI S212.
 4. Lateral Design: AISI S213.
- C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

2.03 FRAMING MATERIALS

- A. Interior Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
1. Gage and Depth: As indicated on drawings.
 2. Flange Width: 1-5/8 inches.
 3. Galvanized in accordance with ASTM A653/A653M, G60/Z180 coating.
- B. Truck Dock Canopy Framing: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
1. Gage and Depth: As indicated on drawings.
 - a. Material Thickness: Minimum base metal thickness:
 - 1) 18 gage, 0.0478 inch.
 2. Flange Width: 1-5/8 inches.

3. Stud Depth: 4 inch.
 4. Galvanized in accordance with ASTM A653/A653M, G90/Z275 coating.
- C. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
1. Gage and Depth: As indicated on drawings.
 - a. Material Thickness: Gage shown on the drawings shall have the following minimum base metal thickness.
 - 1) 22 gage, 0.0299 inch.
 - 2) 18 gage, 0.0478 inch.
 - 3) 16 gage, 0.0508 inch.
 - b. Flange Width: 1-1/4 inches.
- D. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
1. Gage and Depth: As indicated on drawings.
 - a. Material Thickness: Gage shown on the drawings shall have the following minimum base metal thickness.
 - 1) 22 gage, 0.0299 inch.
 - 2) 18 gage, 0.0478 inch.
 - 3) 16 gage, 0.0508 inch.
 - b. Flange Width: 1-3/8 inches.
- E. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:
1. Gage and Depth: As indicated on drawings.
 - a. Material Thickness: Gage shown on the drawings shall have the following minimum base metal thickness.
 - 1) 22 gage, 0.0299 inch.
 - 2) 18 gage, 0.0478 inch.
 - 3) 16 gage, 0.0508 inch.
 - b. Flange Width: 1-5/8 inches.
- F. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
1. Gage and Depth: As indicated on drawings.
 - a. Material Thickness: Gage shown on the drawings shall have the following minimum base metal thickness.
 - 1) 22 gage, 0.0299 inch.
 - 2) 18 gage, 0.0478 inch.
 - 3) 16 gage, 0.0508 inch.
 - b. Flange Width: 1-3/8 inches.
 2. Flange Width: 1-5/8 inches.
- G. Framing Connectors: Factory-made, formed steel sheet.
1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
 2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
 - a. Where continuous studs bypass elevated floor slab, connect stud to slab in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.

- b. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
 - c. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 10 feet.
 - d. Products:
 - 1) ClarkDietrich; Drift FastClip Slide Clip D-FCSC: www.clarkdietrich.com.
 - 2) ClarkDietrich; FastClip Slide Clip FCSC: www.clarkdietrich.com.
 - 3) Simpson Strong Tie: www.strongtie.com.
- 4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
- 5. Wall Stud Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connections where indicated on the drawings.
 - a. Cold-Rolled Channels: 3/4 inch by 1/2 inch and 1-1/2 inch by 17/32 inch or as indicated on Drawings.
 - b. Clip Angles: 2 inches by 2 inches by 16 gage by 1/4 inch less than stud width.
 - c. Products:
 - 1) ClarkDietrich; Spazzer 5400 Bridging Bar: www.clarkdietrich.com.
 - 2) ClarkDietrich; FastBridge Clip: www.clarkdietrich.com.
 - 3) ClarkDietrich; EasyClip U-Series Clip Angles : www.clarkdietrich.com.
 - 4) ClarkDietrich; TradeReady Spazzer 5400 or 9200 bridging and spacing bar: www.clarkdietrich.com.
 - 5) Steel Network; Bridge Bar.
- H. Framing Attachment Angles: Galvanized sheet steel, size, shape and configuration as indicated on Drawings, 14 gage, unless indicated otherwise on Drawings.
 - 1. Contractor's Option: Contact Dietrich Clip Express (330) 372-5564 for alternative selections.
- I. Ceiling Joists and Runners: Galvanized sheet steel, C-shaped.
- J. Flat Metal Straps and Plates: Galvanized sheet steel, gage, shape, and configuration as indicated on Drawings.
 - 1. Contractor's Option: In lieu of 2 inch continuous metal strap at capture tracks, Contractor may provide one of the following:
 - a. The Steel Network; Bridge Bar.
 - b. ClarkDietrich; TradeReady Spazzer 5400 bridging and spacing bar.

2.04 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
- C. Framing to Framing: ASTM C 1513; 5/8 inch Type S-12 low-profile head corrosion-resistant self-drilling self-tapping steel screws.
- D. Framing to Attachment Angle Fasteners: #12 diameter pan head corrosion-resistant self-drilling self-tapping steel screws.
- E. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, ICC-ES AC58, or ICC-ES AC308.
 - 1. Uses: Securing cold-formed steel framing to structure.
 - 2. Type: Torque-controlled expansion anchor or adhesive anchor.
 - 3. Material:

- a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- 4. Wedge Type:
 - a. Hilti Corp; KWIK BOLT II, 1/4 to 1 inch diameter, ICC ESR-1385 and ESR-2302.
 - b. ITW Ramset; TRUBOLT WEDGE, 1/4 to 1-1/4 inch diameter, ICC ESR-3772.
- 5. Sleeve Type:
 - a. ITW Ramset; DYNABOLT SLEEVE, 1/4 to 3/4 inch diameter.
- 6. Shell Type:
 - a. Hilti Corp; SERIES HDI, 1/4 to 1 inch diameter, ICC ESR-4236.
 - b. ITW Ramset; MULTI-SET II, 1/4 to 3/4 inch diameter.
- F. Powder Actuated Fasteners
 - 1. Use of Powder actuated fasteners for tension loads is limited to support of minor loads such as suspended acoustical ceilings, ductwork and conduit.
 - 2. Allowable Loads: Limited to less than 100 lbs.
 - 3. Permissible Loads:
 - a. Stone Aggregate Concrete: Minimum 0.177 inch diameter, minimum penetration 1-7/16 inch. Required Allowable Loads: 100 lbs. or 80 percent of values listed in ICC Report whichever is less.
 - 1) Hilti Corp; Low Velocity Powder-Actuated Fasteners, ICC ESR-1663.
 - 2) ITW Ramset; 3300 SERIES, ICC ESR-1799.
- G. Anchorage Devices: Powder actuated.
- H. Welding: Comply with AWS D1.1/D1.1M.

2.05 ACCESSORIES

- A. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.
- B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify that building framing components are ready to receive work.
- C. Verify that rough-in utilities are in-place and located where required.
- D. Verify field measurements and adjust installation as required.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 07 2100 - Thermal Insulation, in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.03 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Sizes and components as indicated on the drawings.
- C. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.
- D. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.
- E. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- F. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- G. Install load bearing studs, brace, and reinforce to develop full strength and achieve design requirements.
- H. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- I. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

- J. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- K. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.
- L. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
 - 2. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- M. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- N. Install intermediate studs above and below openings to align with wall stud spacing.
- O. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- P. Attach cross studs to studs for attachment of fixtures anchored to walls.
- Q. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- R. Install horizontal bridging in stud system, spaced vertically 48 inches (1220 mm) minimum and as indicated on Drawings. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges, and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- S. Install steel sheet diagonal bracing straps to both stud flanges; terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- T. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- U. Touch-up field welds and damaged galvanized surfaces with primer.
- V. Fastening: Fasten framing in accordance with manufacturer's published instructions and schedule below unless indicated otherwise on Drawings.

FASTENERS	MINIMUM CONNECTION
Floor Track to Concrete	1 Anchor at 36 inches on center
Partition Stud to Floor Track	1 Screw each side at flange
Stud Web to Stud Web	2 Screws
Plates and Straps to Studs	2 Screws
Lateral Bracing to Partition Stud Using clip Angles	2 Screws to stud and 2 Screws to cold rolled channel

Runner to Header	1 Screw at 16 inches on center, maximum 6 inches from each end
Welded Connections	Indicated on Drawings

3.04 INSTALLATION OF JOISTS AND PURLINS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- D. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections.
- E. Place joists at 12 inches on center; not more than 2 inches from abutting walls, and connect joists to supports using fastener method.
- F. Set ceiling joists parallel and level, with lateral bracing and bridging.
- G. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.
- H. Frame openings with built-up joist headers, consisting of joist and joist track or another combination of connected joists if indicated.
- I. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement.
 1. Install web stiffeners to transfer axial loads of walls above.
- J. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
 1. Joist-Track Solid Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
 2. Combination Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- K. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- L. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.
- M. Provide web stiffeners at reaction points.
- N. Touch-up field welds and damaged galvanized surfaces with primer.

3.05 SOFFIT FRAMING:

- A. Install soffit framing and fasteners in accordance with manufacturer's published instructions.
- B. Soffit Framing Spacing: 16 inches on center beginning from center of room unless otherwise shown on the drawings.
- C. Install framing in direction of shortest span, parallel and level, with lateral bracing and bridging.
- D. Install framing in one piece full length. Splicing of members not permitted.
- E. Install perimeter channel runner track sized to match framing members. Attach channel runner track to wall framing with minimum 2 screws per stud and at corners and ends.
- F. Attach ends of channel framing members to runner tracks with minimum 1 screw each side at each flange.

1. Install bridging at 48 inches on center beginning from center of room with 1-1/2 inch rolled channels screw attached to framing members.

3.06 TRUCK DOCK CANOPY FRAMING:

- A. Secure studs to intersecting structure in accordance with requirements previously specified.
- B. Frame both sides of expansion and control joints with separate studs.
- C. Final installation shall be level and aligned within tolerance of 1/4"/20'.

3.07 TOLERANCES

- A. Maximum Variation from True Position: 1/8 inch.
- B. Maximum Variation of any Member from Plane: 1/8 inch.

3.08 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- F. Welding (General):
 1. Prior to start of fabrication, determine if fabrication shop meets the criteria for exempting shop welds from inspection and confirm in writing to building official and SER.
 2. Verify qualifications of all welders as AWS certified.
 3. Verify proposed welding procedures and materials.
 4. Verify adequate preparation of faying surfaces.
 5. Verify preheat and interpass temperatures of steel, proper technique and sequence of welding, and cleaning and number of passes are provided as required.
- G. Welding (Field):
 1. Cold Formed Metal Framing Welds: Visually inspect 100% of welds for specified length, size, and continuity in accordance with AWS D1.3 for metal less than 1/8" in thickness, for work designed as a structural element.
 2. Miscellaneous Metals, Inserts and Prefabricated Components: Where integrity of the connections impact life safety or performance of the building structure, provide testing and inspection as for typical welds previously specified.
- H. Miscellaneous Mechanical Fasteners: Visually inspect specified size, spacing, embedment, and location that are part of the building structural system.
- I. Submittal Verification: Verify mill test reports and other submitted documentation for compliance with contract documents.
- J. Material Verification: Verify materials delivered to site comply with contract documents and approved shop drawings. Materials include:
 1. Bolts
 2. Electrodes
 3. Mechanical fasteners
- K. Verification of Detail Compatibility:
 1. Inspect on a periodic basis:
 2. Review project documents affecting integrity of the structure including contract documents and approved shop drawings.
 3. Visit site at intervals appropriate to the stage of construction to perform review of the structure and visually confirm general compliance with the contract documents.
 4. Inspect the following to verify that member orientation, configuration, type, and size comply with details indicated on the contract documents and approved shop drawings:

- a. Bracing and stiffening members.
- b. Proper applications of joint details at connections for structural members.
- c. Other work critical to the integrity of the building structure.

3.09 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel and aluminum items.
- B. Fabrication and installation of plate steel and guard posts for protection of in-plant distribution panels and at other locations shown on the plans.
- C. Fabrication and erection of structural steel angles or bent plates at edge of metal deck for concrete closures and roof curb supports.
- D. Fabrication and installation of pipe guards required by the drawings for protection of drive-thru traffic door jambs, dock door jambs, sprinkler risers, P.I.V. valves, etc.
- E. Fabrication and installation of embedded structural steel angles for protection of concrete edges at dock leveler pits.
- F. Fabrication and installation of miscellaneous bearing plates, connectors, etc., required by the drawings to be cast in concrete construction.
- G. Fabrication and installation of structural steel angles at the bottom of the fire wall conveyor openings to serve as a sill for the coiling fire doors.
- H. Fabrication and installation of structural steel materials to mount all HVAC equipment as shown on the drawings.
- I. Fabrication and installation of structural steel as shown on the drawings for restroom and breakroom accessories.
- J. Fabrication and installation of guardrails as shown on the drawings surrounding the new restroom and breakroom area.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 09 9113 - Exterior Painting: Paint finish.
- C. Section 09 9123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014 (Editorial 2017).
- G. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

- J. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).
- K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Submit two copies of manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of miscellaneous steel work and/or for manufactured miscellaneous steel items required under this Section of the Specifications.
- C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified steel fabricator that is accredited by the AISC Quality Certification Program with a minimum designation of Building Fabricator (BU).
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.06 FIELD CONDITIONS

- A. If possible, design metal fabrications so that they do not have to fit other construction.
- B. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, exposed or electrolytic zinc-coated, ASTM A 879/A 879M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.
- F. Slotted Channel Framing: ASTM A653/A653M, Grade 33.
- G. Slotted Channel Fittings: ASTM A1011/A1011M.
- H. Lag Bolts: Square head type, complying with requirements of Federal Specification FF-B-561.

- I. Toggle Bolts: Tumble-wing type, complying with Federal type, class and style as required for the anchorage and/or fastening.
- J. Machine Screws: Cadmium plated steel screws, complying with the requirements of Federal Specification FF-S-92.
- K. Plain Washers: Round, carbon steel washers, complying with requirements of Federal Specification FF-W-92.
- L. Lock Washers: Helical spring type, carbon steel washers, complying with requirements of Federal Specification FF-W-84.
- M. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, ICC-ES AC58, or ICC-ES AC308.
 - 1. Uses: Securing cold-formed steel framing to structure.
 - 2. Type: Torque-controlled expansion anchor or adhesive anchor.
 - 3. Material:
 - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
 - 4. Wedge Type:
 - a. Hilti Corp; KWIK BOLT II, 1/4 to 1 inch diameter, ICC ESR-1385 and ESR-2302.
 - b. ITW Ramset; TRUBOLT WEDGE, 1/4 to 1-1/4 inch diameter, ICC ESR-3772.
 - 5. Sleeve Type:
 - a. ITW Ramset; DYNABOLT SLEEVE, 1/4 to 3/4 inch diameter.
 - 6. Shell Type:
 - a. Hilti Corp; SERIES HDI, 1/4 to 1 inch diameter, ICC ESR-4236.
 - b. ITW Ramset; MULTI-SET II, 1/4 to 3/4 inch diameter.
- N. Powder Actuated Fasteners
 - 1. Use of Powder actuated fasteners for tension loads is limited to support of minor loads such as suspended acoustical ceilings, ductwork and conduit.
 - 2. Allowable Loads: Limited to less than 100 lbs.
 - 3. Permissible Loads:
 - a. Stone Aggregate Concrete: Minimum 0.177 inch diameter, minimum penetration 1-7/16 inch. Required Allowable Loads: 100 lbs. or 80 percent of values listed in ICC Report whichever is less.
 - 1) Hilti Corp; Low Velocity Powder-Actuated Fasteners, ICC ESR-1663.
 - 2) ITW Ramset; 3300 SERIES, ICC ESR-1799.
- O. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- P. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- Q. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- R. Shop and Touch-Up Primer: Modified Alkyd Primer, Ferrell Calhoun Tuff Boy 27-61 or equal, Gray in color.
- S. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.
- T. Exterior Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.
 - 1. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 - 2. Tnemec:

- a. Under Acrylics: Series 115 Uni-Bond DF; Applied at a dry film thickness rate of not less than 3.0 mils.
- U. Zinc-Rich Primer
 - 1. Inorganic, zinc-rich, capable of providing sound foundation for field applied top coats despite prolonged exposure, cathodic protection and corrosion resistance.
 - 2. Maximum Allowable Dry Time: 1 hour to touch; 12 hours to top coat.
 - 3. Pigment Content: Minimum 63% zinc in dry film by weight.
 - 4. Compatible with finish paint system specified in Section 09 9600 - High-Performance Coatings.
 - 5. Acceptable Products:
 - a. Carboline Company, Carbo-Zinc 859 VOC.
 - b. Tnemec Co.; 94-H2O.
 - c. ZRC Products Company, ZRC Zero VOC Galvanizing Compound.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
 - 1. Side Rails: 3/8 x 2 inches members spaced at 20 inches.
 - 2. Rungs: one inch diameter solid round bar spaced 12 inches on center with slip resistant coating or #8 rebar in A706 weldable grade.
 - 3. Space rungs 7 inches from wall surface.
- B. Wall Corner Guards: As detailed; galvanized finish.
 - 1. Bent Plante: Size as indicated on Drawings.
- C. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.

2.04 METAL BOLLARDS

- A. Fabricate exterior and interior metal bollards from 6 inch diameter Schedule 40 steel pipe.
 - 1. Concrete filled, crowned cap.
 - 2. Exterior Bollards in Slab on Grade: Penetration depth below top of slab to equal detailed height; core hole in slab on grade 2 inches larger than bollard diameter, and fill joint at slab with a non-shrink grout; prime paint finish.
 - 3. Interior Bollards on Topping Slab: Fully weld to 1/2 inch thick steel base plate with four through bolts; provide 1/2 inch thick base plate "washer" for underside of precast concrete structural tee; provide template for coring holes 1/2 inch larger in diameter than bolts provided; grout base plate; provide galvanized hardware as required and specified; galvanized.
- B. Prime interior steel bollards with zinc-rich primer.
- C. Galvanize and prime exterior steel bollards with universal primer.
- D. Finish Paint: As indicated in Section 09 9113 - Exterior Painting.
 - 1. Color: Paint OSHA Safety Yellow or as specified by Owner requirements.

2.05 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.06 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete and items to be embedded in masonry.
- B. Prepare surfaces to be primed in accordance with SSPC-SP6.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

2.07 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

3.05 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2 mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 9113 - Exterior Painting and Section 09 9123 - Interior Painting.

- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 06 1053
MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wood blocking and nailers.
 - 2. Plywood backing panels.
 - 3. Plywood backing panels behind gypsum board.
 - 4. Wood framing systems required for support and attachment of finish carpentry work.
 - 5. Wood block backing for vanity cabinets and toilet partitions.
 - 6. Wood nailers and/or plywood OSB per the drawings and specifications.

1.02 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASME B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series); 2012, Including July 2013 Errata.
- C. ASME B18.21.1 - Washers: Helical Spring-Lock, Tooth Lock, and Plain Washer (Inch Series); 2009.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014 (Editorial 2017).
- E. ASME B18.22 - Plain Washers; 1965 (Reaffirmed 2008).
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- G. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- H. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2018a.
- I. ASTM F1941/F1941M - Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric; 2016.
- J. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2017.
- K. ASTM F594 - Standard Specification for Stainless Steel Nuts; 2009 (Reapproved 2015).
- L. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- M. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- N. AWWA U1 - Use Category System: User Specification for Treated Wood; 2012.
- O. ICC (IBC) - International Building Code; 2015.
- P. ICC-ES AC310 - Water-resistive Membranes Factory-bonded to Wood-based Structural Sheathing, Used as Water-Resistive Barriers; 2015.
- Q. PS 1 - Structural Plywood; 2009.
- R. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
- S. PS 20 - American Softwood Lumber Standard; 2010.
- T. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2004, and supplements.
- U. WWP A G-5 - Western Lumber Grading Rules; 2011.

1.03 DEFINITIONS

- A. Blocking: Wood used for plates, furring, shimming, stripping, sleepers, grounds, curbing, cants, bracing, nailers, and filling in between framing members.

- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NLGA: National Lumber Grades Authority.
 - 2. WCLIB: West Coast Lumber Inspection Bureau.
 - 3. WWPA: Western Wood Products Association.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - a. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - b. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - c. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - d. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - e. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
 - 2. Evaluation Reports: For the following, from ICC-ES:
 - a. Fire-retardant-treated wood.
 - b. Power-driven fasteners.
 - c. Powder-actuated fasteners.
 - d. Metal framing anchors.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 01 8114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 3. 5.504.4.5 Formaldehyde Limit requirements.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- B. Grade Marks:
 - 1. Identify lumber and plywood by official grade mark.
 - 2. Lumber: Include symbol of grading agency, mill name, grade, species, grading rules, and condition of seasoning at time of manufacturer.
 - 3. Plywood: Include type, class identification index, and agency mark.
 - 4. Pressure treatment: Include quality mark of grading agency which maintains continued supervision, testing, inspection, and re-examination service over product quality as described in AWPA standards.
 - 5. Fire-retardant treated wood: Imprint each piece with mark attesting to FR-S rating.

- C. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
- D. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- E. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Lumber and Plywood shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001 and FSC STD-40-004.
- B. Regional Materials: Dimension lumber shall be manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
- C. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Provide dressed lumber, S4S, unless otherwise indicated.
- D. Maximum Moisture Content of Lumber: 15 percent for 2 inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

2.03 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWP A U1:
 - 1. Use Category UC3b for exterior construction not in contact with ground.
 - 2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

2.04 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-

test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.05 DIMENSION LUMBER FRAMING

- A. Framing: Construction or No. 2.
 - 1. Southern pine; SPIB.
 - 2. Douglas fir-larch; WCLIB or WWP.

2.06 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Cants. Construction or No. 2
 - 4. Furring.
 - 5. Grounds.
 - 6. Minimum 1-1/2 inch thick lumber, Douglas Fir or Southern Yellow Pine Species, No. 2 Grade or better and pressure treated for rot resistance, Wolmanized or Osmose K-33.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
 - 1. Spruce-pine-fir; NLGA.
 - 2. Douglas fir-larch; WCLIB or WWP.
 - 3. Hem-fir; WCLIB or WWP.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.07 PLYWOOD PANELS

- A. Backing Panels: Plywood, DOC PS 1, Interior, B-D, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch nominal thickness.

- B. Plywood Sheathing: DOC PS 1, Exposure 1 sheathing.
 - 1. Span Rating: Not less than 24/0.
 - 2. Nominal Thickness: Not less than 1/2 inch.

2.08 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Anchors: Toggle bolt type for anchorage to hollow masonry.
- D. Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
- E. Bolts or ballistic fasteners for anchorage to steel.
- F. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
- G. Eyebolts: ASTM A489.
- H. Machine Screws: ASME B18.6.3.
- I. Lag Bolts: ASME B18.2.1.
- J. Wood Screws: Flat head, ASME B18.6.1.
- K. Plain Washers: Round, ASME B18.22.
- L. Lock Washers: Helical, spring type, ASME B18.21.1.
- M. Masonry Anchorage Devices: Expansion shields.
- N. Power-Driven Fasteners: NES NER-272.
- O. Wood Screws: ASME B18.6.1.
- P. Screws for Fastening to Metal Framing: ASTM C 954, length as recommended by screw manufacturer for material being fastened.
- Q. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, ICC-ES AC58, or ICC-ES AC308.
 - 1. Uses: Securing cold-formed steel framing to structure.
 - 2. Type: Torque-controlled expansion anchor or adhesive anchor.
 - 3. Material:
 - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F593, and nuts, ASTM F594.
 - 4. Wedge Type:
 - a. Hilti Corp; KWIK BOLT II, 1/4 to 1 inch diameter, ICC ESR-1385 and ESR-2302.
 - b. ITW Ramset; TRUBOLT WEDGE, 1/4 to 1-1/4 inch diameter, ICC ESR-3772.
 - 5. Sleeve Type:
 - a. ITW Ramset; DYNABOLT SLEEVE, 1/4 to 3/4 inch diameter.
 - 6. Shell Type:
 - a. Hilti Corp; SERIES HDI, 1/4 to 1 inch diameter, ICC ESR-4236.
 - b. ITW Ramset; MULTI-SET II, 1/4 to 3/4 inch diameter.

2.09 METAL FRAMING ANCHORS

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.

- B. Hot-Dip Heavy-Galvanized Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- C. Stainless-Steel Sheet: ASTM A666, Type 304.
 - 1. Use for exterior locations and where indicated.

2.10 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.

2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
- J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.02 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- B. Discard units of material with defects that might impair quality of work and units that are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- C. Set nailers to required levels and lines with members plumb and true.
- D. Perimeter nailers shall be of uniform height within a given roof section.
- E. Nailers install with 1/4 inch gap between ends of adjoining pieces.
- F. Fasten nailers in accordance with the following schedule:
 1. Fasteners in 6 inches or wider (nominal) lumber shall be installed in two rows, staggered one-third of nailer width. Listed spacings indicate distance between fasteners in adjacent rows.
 2. Two fasteners shall be installed within 6 inches of each nailer end.
 3. Corner fastener spacing shall extend 8 feet from all outside building corners.
 4. Where two or more nailers are installed, each nailer shall be fastened independently.
 5. Over all deck types, the bottom nailer shall be fastened using the specified fasteners and 5/8 inch diameter washers. Countersink washers and fasteners level with top of wood using spade bit or similar method. Fasten subsequent nailers, where specified, using the specified screws without washers.
 6. Maximum fastener spacing shall be as specified on the drawings.

3.03 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring horizontally and vertically at 24 inches (600 mm) o.c.

3.04 PROTECTION

- A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items as shown on the drawings.
- B. Plywood wainscot as shown on the drawings.
- C. Engineered wood beams in restrooms as shown on the drawings.
- D. Adjustable shelving not associated with architectural wood casework.
- E. Hardware and attachment accessories as needed according to the drawings.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Painting of finish carpentry items.

1.03 REFERENCE STANDARDS

- A. AWI (QCP) - Quality Certification Program; current edition at www.awiqcp.org.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2009.
- D. PS 1 - Structural Plywood; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. Product Data:
 - 1. Provide data on fire retardant treatment materials and application instructions.
 - 2. Provide instructions for attachment hardware and finish hardware.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI (AWS).
 - 2. Include certification program label.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company with at least one project within the past 5 years with value of woodwork within 20 percent of cost of woodwork for this project.
 - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Quality Certification:
 - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
 - 2. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
 - 3. Provide designated labels on shop drawings as required by certification program.
 - 4. Provide designated labels on installed products as required by certification program.
 - 5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Interior Woodwork Items:
 - 1. Shelving as indicated on the drawings.

2.02 LUMBER MATERIALS

- A. Softwood Lumber for Interior Trim: PS 20; white pine species, plain or quarter sawn, maximum moisture content of 19 percent according to ASTM D4442; with flat grain, of quality suitable for opaque finishes.
 - 1. Grading: In accordance with rules certified by ALSC; www.alsc.org.

2.03 SHEET MATERIALS

- A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- B. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- C. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

2.04 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Adhesive for factory-fabricated units: Manufacturer's recommended adhesive for application.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Lumber for Shimming and Blocking: Softwood lumber of pine species.
- C. Primer: Alkyd primer sealer.
- D. Wood Filler: Solvent base, tinted to match surface finish color.

2.06 HARDWARE

- A. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
 - 1. Spacing: Ends of shelves and at intermediate intervals not exceeding 4'-0", and as indicated on Drawings.
 - 2. Finish: Chrome.
 - 3. Product:
 - a. Shelf Standards: Knappe and Vogt; #87, heavy duty, slotted type.
 - b. Bracket: Knappe and Vogt; #186.

2.07 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.08 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section Interior Painting 09 9123.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

END OF SECTION

SECTION 06 4116

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.

1.02 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWI (QCP) - Quality Certification Program; current edition at www.awiqcp.org.
- C. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
- D. GSA CID A-A-1936 - Adhesive, Contact, Neoprene Rubber; Revision A, 1996.
- E. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Field verify critical dimensions and clearances prior to fabrication of casework items; assure that field conditions are as required to comply with indicated design requirements.
 - 2. By accurate field measurements before being enclosed, verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork; record measurements on shop drawings.
 - 3. Coordinate construction to ensure that actual dimensions correspond to established required dimensions.
- B. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this Section; require attendance by all affected installers.
 - 1. Agenda:
 - a. Discuss and agree upon acceptable delivery, storage, and handling, environmental conditions, preparatory work, and methods of installation.
 - b. Review coordination and environmental controls required for proper installation and ambient temperature and humidity conditioning in areas to receive woodwork.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 2. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
 - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 4. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural wood cabinets.
 - 5. Show plastic laminate with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
 - 6. Provide the information required by AWI/AWMAC/WI (AWS).
 - 7. Shop drawings are required to be generated as separate digital drawings specific to this Project, not utilizing Architect's digital drawing files in any manner.
 - 8. Show all adjacent construction including abutting walls, columns and similar elements affecting casework installation.
 - 9. Use Owner's casework designation system on shop drawings; system will be provided by Owner prior to preparation of shop drawings.
 - 10. Product Data: Provide data for hardware accessories.

11. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
12. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
13. Samples for Verification:
 - a. Plastic laminates, 12 by 12 inches (300 by 300 mm), for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
 - b. Wood-grain plastic laminates, 12 by 24 inches (300 by 600 mm), for each type, pattern and surface finish, with one sample applied to core material and specified edge material applied to one edge.
 - c. Thermoset decorative panels, 8 by 10 inches (200 by 250 mm), for each color, pattern, and surface finish, with edge banding on one edge.
 - d. Corner pieces as follows:
 - 1) Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - 2) Miter joints for standing trim.
 - e. Exposed cabinet hardware and accessories, one unit for each type and finish.
- B. Informational Submittals:
 1. Qualification Data: For installer.
 2. Product Certificates: For each type of product.
 - a. Composite wood and agrifiber products.
 - b. Thermoset decorative panels.
 - c. Adhesives.
 3. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
 4. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 01 8114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 4. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - a. Plastic-laminate cabinets shall be manufactured within 500 miles of project site.
 5. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 6. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

1.06 QUALITY ASSURANCE

- A. Single Source Responsibility: Single manufacturer shall provide and install work described in this Section.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- C. Installer Qualifications: Fabricator of products, Certified participant in AWI's Quality Certification Program.

- D. Fabrication and Installation Standards: Fabricate and install in accordance with Architectural Woodwork Standards, Edition 2 as listed below.
 - 1. Lumber grades: Section 3.
 - 2. Panel products: Section 4.
 - 3. Casework: Section 10.
- E. Woodwork Certification:
 - 1. Before delivery to jobsite, woodwork supplier shall submit Woodwork Institute Certified Compliance Certificate indicating millwork products being supplied and certifying that products fully meet the requirements of Grade or Grades specified.
 - 2. Each elevation of casework, each laminated plastic top, and each solid surface top shall bear Woodwork Institute Certified Compliance Label.
 - 3. At completion of installation, woodwork installer shall provide Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
 - 4. All fees charged by the Woodwork Institute for their Certified Compliance program are responsibility of millwork manufacturer and/or installer and shall be included in their bid.
 - 5. The foregoing shall not be construed to limit power and authority of Owner to reject any millwork which does not in Owner's opinion meet with any one or more of the specifications of this Contract.
- F. Fees charged by Woodwork Institute for Monitored Compliance Program are responsibility of Contractor.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver casework items to installation areas only after clean, well ventilated, and temperature-controlled installation areas are available. Do not deliver casework items to installation areas until painting and similar operations are complete in those areas.
- B. Protect units from moisture and impact damage during transit, delivery, and storage; use protective covers during delivery, storage, and handling operations..

1.08 ENVIRONMENTAL CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 deg F and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- D. WARRANTY
 - 1. Furnish warranty with provisions for repairing or replacing, at no additional cost to Owner, architectural woodwork items that exhibit defects in material or workmanship for 2 years.

PART 2 PRODUCTS

2.01 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) , unless noted otherwise.
 - 1. Provide certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.
- B. Type of Construction: Face frame.
 - C. Cabinet and Door and Drawer Front Interface Style: Lipped.
 - D. Case: Plywood with plastic laminate.
 - E. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
 - F. Drawer Bottoms: Thermoset decorative panels.
 - G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
 - H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.
 - I. Cabinets :
 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
 2. Finish - Exposed Interior Surfaces: Thermoset decorative panels.
 3. Finish - Concealed Surfaces: Thermoset decorative panels.
 4. Casework Construction Type: Type A - Frameless.
 5. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.

2.02 LAMINATE MATERIALS

- A. Basis of Design Product:
 1. Formica Corporation: www.formica.com.
 2. Acceptable Manufacturers:
 - a. Formica Corporation: www.formica.com.
 - b. Panolam Industries International, Inc./Nevamar: panolam.com/nevamar.
 - c. Panolam Industries International, Inc./Pionite: panolam.com/pionite.
 - d. Wilsonart International, Inc.: www.wilsonart.com.
 - e. Approved equal.
- B. Pattern and Texture: As selected by Owner.
- C. High Pressure Decorative Laminate (HPDL) - Plastic Laminate: NEMA LD 3, types as recommended for specific applications.
 1. Provide specific types as follows:
 - a. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - b. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - c. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - d. Post-Formed Vertical Surfaces: VGP, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - e. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - f. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.
 - g. Edges: Grade HGS.
 - 1) Semiexposed Surfaces: Grade HGS.
 - 2) Edges of Thermoset Decorative Panel Shelves: PVC T-mold matching laminate in color, pattern, and finish.
 - h. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

2.03 COUNTERTOPS

- A. Countertops: Specified in Section 12 3600 - Countertops.

2.04 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
 - 2. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade 130 and made with binder containing no urea formaldehyde.
 - 3. Softwood Plywood: DOC PS 1.
- C. Thickness:
 - 1. Panel structural components: Minimum 3/4 inch thick.
 - 2. Back Panels, Drawer Components, and Drawer Bottoms: Minimum 1/2 inch thick.
 - 3. Fixed Shelves, Dividers, Mounting Stretchers: Minimum 3/4 inch thick.
 - 4. Semi-exposed Adjustable Shelves in Cabinets under 36 inches Wide: Minimum 3/4 inch thick.
 - 5. Shelves in Cabinets 36 inches Wide or Greater: Minimum 1 inch thick.

2.05 ACCESSORIES

- A. Adhesive: Type recommended by AWI/AWMAC to suit application.
- B. Counter Support Brackets: Tempered, fabricated steel brackets designed for surface or flush mounting as indicated; sizes and configurations as indicated.
 - 1. Acceptable Product: Rangine Corporation; Rakks EH-Series - Counter Support Brackets; www.rakks.com.
- C. Fasteners: Size and type to suit application.
- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- E. Concealed Joint Fasteners: Threaded steel.
- F. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.06 HARDWARE

- A. Hardware Finish: U.S. 10B oxidized, satin bronze finish.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
 - 1. Finish: Chrome.
 - 2. Product:
 - a. Shelf Standards: Knappe and Vogt; #85, heavy duty, slotted type.
 - b. Bracket: Knappe and Vogt; #186.
- C. Shelf Rests: BHMA A156.9, B04013; metal.
 - 1. Location: 4 per shelf.
 - 2. Basis of Design Product:
 - a. Hafele 282.04.711.

- b. Hafele 282.24.13.
- D. Drawer and Door Pulls: 3-1/2 inch pull, fabricated of solid brass with brushed bronze finish..
 - 1. Basis of Design Product::
 - a. Stanley; #4478.
- E. Locks:
 - 1. Key locks inside one room alike. Furnish 3 keys for each lock keyed separately, and 2 keys for each lock keyed alike in groups. Master keys shall be tagged and delivered to the Owner Representative. Locks and keys shall be stamped with coded set number/direct digit.
 - 2. series. Change keys shall also be stamped with set numbers direct digit.
 - 3. Cabinet locks shall be master-keyed and keyed alike. Backside of cabinet lock bolts (on visible side following installation) and change keys shall be stamped with manufacturer's code, either direct digit or coded.
 - 4. Master Keys: National GM2
 - 5. Drawer Locks: Keyed cabinet-grade lock, two keys per lock, steel with satin finish.
 - a. General: Disc or pin tumbler, surface mounted.
 - b. Acceptable Products:
 - 1) National Cabinet Lock; 68-3718 x 68-2480C brass strike.
 - 2) Olympus; 200 DW x 12-1 strike.
 - 3) Prior approved equal.
 - 6. Cabinet Locks: Keyed cabinet-grade lock, two keys per lock, steel with satin finish.
 - a. General: Disc or pin tumbler, surface mounted.
 - b. Acceptable Products:
 - 1) National Cabinet Lock; No. 3713 x 2475-172.
 - 2) Olympus; 100DR x 12-1 strike.
 - 3) Prior approved equal.
- F. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
 - 1. Acceptable Products:
 - a. Epco; No. 592.
 - b. Lawrence; No. SC1364-AL.
 - c. Stanley; #41.
- G. Drawer Slides
 - 1. Type: Full extension, self-closing.
 - 2. Static Load Capacity: Commercial grade.
 - a. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 2.
 - b. For drawers more than 3 inches (75 mm) high but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
 - c. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-200.
 - d. For computer keyboard shelves, provide Grade 1HD-100
 - e. For trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide, provide Grade 1HD-200.
 - 3. Mounting: Bottom mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
 - 6. Acceptable Manufacturers:
 - a. Accuride International, Inc.: www accuride.com.
 - b. Grass America Inc.: www.grassusa.com.
 - c. Hettich America, LP: www.hettichamerica.com.
 - d. Knappe & Vogt Manufacturing Company: www.knappeandvogt.com.
 - e. Prior approved equal.

- H. Concealed Cabinet Hinge: Wrought steel and designed with raised barrel to permit door to open 180 deg.
 - 1. Basis of Design Product:
 - a. Stanley; #1535.
 - b. Approved equal.
- I. Mutes: Rubber, approximately 1/4 inch diameter, colors to match adjacent finish.

2.07 FABRICATION

- A. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets: 1/16 inch unless otherwise indicated.
- B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- D. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- E. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- F. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- G. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Apply low pressure laminate to inside of cabinets on exposed and semi-exposed surfaces, and to shelving surfaces.
 - 3. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- H. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this Section.
- C. Verify critical clearances and dimensions prior to installation of casework items.

3.02 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
 - 1. Condition cabinets to humidity conditions 72 hours minimum.

- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.03 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop
- C. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- D. Use fixture attachments in concealed locations for wall mounted components.
- E. Use concealed joint fasteners to align and secure adjoining cabinet units.
- F. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- G. Secure cabinets, counter bases, and other casework to floor using appropriate angles and anchorages.
- H. Secure full height cabinets, shelving units, and similar casework items exceeding 60 inches in height to floor using appropriate angles and anchorages
- I. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- J. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96 inches sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Provide fabricator's standard concealed fasteners.

3.04 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.
- C. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

3.05 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.06 PROTECTION

- A. Protect installed casework items from damage due to subsequent construction operations.

END OF SECTION

SECTION 06 8316
FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass reinforced plastic panels in the new restrooms as shown on the drawings.

1.02 REFERENCE STANDARDS

- A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010 (Reapproved 2018).
- B. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor; 2013a.
- C. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- D. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2017.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- F. FDA Food Code - Chapter 6 - Physical Facilities; Current Edition.

1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- B. Samples: Submit two samples 12 by 12 inch in size illustrating material and surface design of panels.

1.04 QUALITY ASSURANCE:

- A. Standards: Comply with USDA Criteria for incidental food contact and ASTM E84, Class C, for surface burning characteristics of flame spread less than 200 and smoke density less than 450.
- B. Use of adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for performance of the Work of this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Fiberglass Reinforced Plastic Panels:
 - 1. Kemlite; Glasbord-P No. BES385PIF : www.kemlite.com.
 - 2. Other Acceptable Manufacturers - Panels:
 - a. Crane Composites, Inc.: www.cranecomposites.com.
 - b. Glasteel: www.glasteel.com.
 - c. Marlite: www.marlite.com.
 - d. Nudo Products, Inc.: www.nudo.com.
 - e. Prior approved equal.

2.02 PANEL SYSTEMS

- A. Wall Panels:
 - 1. Panel Size: 4 by 8 feet.
 - 2. Panel Thickness: 0.10 inch.
 - 3. Surface Design: Embossed.
 - 4. Color: White.

5. Attachment Method: Adhesive only, with trim and sealant in joints.

2.03 MATERIALS

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Scratch Resistance: Barcol hardness score greater than 35, when tested in accordance with ASTM D2583.
 4. Impact Strength: Greater than 6 ft lb force per inch, when tested in accordance with ASTM D256.
 5. Surface Characteristics and Cleanability: Provide products that are smooth, durable, and easily cleanable, in compliance with FDA Food Code, Chapter 6 - Physical Facilities.
- B. Fasteners: Nylon rivets.
- C. Adhesive: Type recommended by panel manufacturer.
- D. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.

3.02 PREPARATION

- A. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- B. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- C. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- D. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches (300 mm) wide.
 1. Mark plumb lines on substrate at panel joint locations for accurate installation.
 2. Locate panel joint to allow clearance at panel edges according to manufacturer's written instructions.

3.03 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Drive fasteners to provide snug fit, and do not over-tighten.
- G. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- H. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Batt insulation in exterior wall and ceiling construction.

1.02 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2018a.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2016a.

1.03 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.04 QUALITY ASSURANCE

- A. Comply with fire resistance and flammability ratings as shown and specified.
- B. Thicknesses specified are for the thermal conductivity (k-value at 75 degrees F) specified for each material. Provide adjusted thicknesses for approved use of substituted materials with different thermal conductivity ratings. Where insulation is specified to have a specific "R" value, furnish manufacturer's standard thickness required to equal or exceed the specified value.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.
- B. Protect plastic insulation from exposure to direct sunlight.
- C. Do not deliver plastic insulation materials to the project site ahead of time of installation. Protect at all times against ignition. Complete the installation and concealment of plastic materials as soon as possible in each area of work.

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 FOAM BOARD INSULATION MATERIALS

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
 - 1. Classifications:
 - a. Type I: Faced with white aluminum foil on both major surfaces of the core foam.
 - 1) Class 1 - Non-reinforced core foam.
 - 2) Compressive Strength: 25 psi, minimum.
 - 3) Thermal Resistance, R-value: 22 At 1-1/2 inch thick; 9.8 at 75 degrees F.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.

3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Board Size: 48 inches wide, height as indicated on Drawings.
5. Board Thickness: As indicated on Drawings.
6. Board Edges: Square.
7. Basis of Design Product:
 - a. Dow Chemical Company; THERMAX Light Duty: www.dowbuildingsolutions.com.
 - b. Other Acceptable Manufacturers:
 - 1) Atlas Roofing Corporation: www.atlasroofing.com.
 - 2) Carlisle Coatings & Waterproofing, Inc: www.carlisleccw.com.
 - 3) GAF: www.gaf.com.
 - 4) Hunter Panels: www.hunterpanels.com.
 - 5) Johns Manville: www.jm.com.

2.02 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 4. Facing: Unfaced.

2.03 LOOSE-FILL INSULATION

- A. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84, 2009 Edition.
 1. Location: Tight spaces that batt insulation will not fit.

2.04 ACCESSORIES

- A. Sheet Vapor Retarder: White polypropylene film, fiberglass and polyester scrim for above grade application, 10 mil, 0.010 inch thick.
 1. Permeance: 0.09 perm (grains/hr.ft².in Hg) per ASTM E96/E96M.
 2. Product:
 - a. Lamtec Corporation; WMP-VR.
- B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 2. Width: Are required for application.
- C. Joint Closure System:
 1. Bottom Edge Support: J-channel strip.
 2. Horizontal and Vertical Closure: Two-piece male/female interlocking strip. Base sections are fastened to concrete wall and top "T" section snaps into base section to securely hold insulation board in place for a snug fit.
 3. Finish: Classic Bright White.
 4. Product:
 - a. Victory Bear Products; PVC Flex Tite: www.victorybear.com.
- D. Washer/Fastener Assembly: 2-3/8 inch diameter exterior washer with plug and pin assembly. Select length to ensure tight fit without dimpling surface of insulation boards.
 1. Pneutek; XIW Insulation Fastening System: www.pneutek.com.
- E. Sealant: Butyl.
 1. Product:
 - a. Inland Inc.; Innerbond 201 Butyl Rubber Sealant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Align PVC J-channel horizontally along concrete wall at bottom of insulation material at elevations shown on drawings. Nail into place through holes provided at 12 inches o.c. with pneumatic nailer or equivalent.
- B. Align PVC interlock system vertically at desired spacing on concrete wall. Adjust the base PVC strip to allow for the correct width and height of insulation boards. Align each PVC section 1/8 inch from the edge of insulation boards and attach. Nail into place through holes provided at 12 inches o.c. with pneumatic nailer or equivalent.
- C. Apply beads of butyl caulk to the rear of insulation board at 5 feet o.c. horizontally. Slide bottom edge of insulation board into J-channel and press board firmly into position between the PVC base strips.
- D. Guide the top "T" PVC section along finish board edge until this interlocking piece snaps into place.
- E. Install white plastic washer/fastener assembly through front side of insulation boards at 5 feet o.c. vertically.
- F. Final insulation system installation shall be level, straight and true with tight, aligned joints.

3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.04 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 4113
METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural roofing system of preformed aluminum panels.
- B. Architectural roofing system of preformed aluminum panels.
- C. Attachment system.
- D. Finishes.
- E. Accessories.

1.02 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- D. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2017.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Summary of test results, indicating compliance with specified requirements.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty.
- B. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field-fabricated or field-assembled.
- C. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
 - 1. Include typical panel joint in sample.
 - 2. Include typical fastening detail.
- E. Manufacturer Qualification Statement: Provide documentation showing metal roof panel fabricator is accredited under IAS AC472.
- F. Test Reports: Indicate compliance of metal roofing system to specified requirements.
- G. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.05 WARRANTY

- A. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence

of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 30 years from Date of Substantial Completion.

- B. Waterproofing Warranty: Provide manufacturer's No Dollar Limit Warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of 20 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Metal Roof Panels:
 - 1. Petersen Aluminum Corporation; Snap-Clad Panel: www.pac-clad.com.

2.02 ARCHITECTURAL METAL ROOF PANELS

- A. Architectural Metal Roofing: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. **Confirm profile, color, and design to match existing.**
- C. Metal Panels: Factory-formed panels with factory-applied finish.
 - 1. Aluminum Panels:
 - a. Alloy and Temper: Aluminum complying with ASTM B209 (ASTM B209M); temper as required for forming.
 - b. Thickness: Minimum 24 gage (.025 inch).
 - 2. Profile: Standing seam, with minimum 1-3/4 inch seam height; concealed fastener system for field seaming with special tool.
 - 3. Texture: Smooth.
 - 4. Width: Maximum panel coverage of 18 inches.

2.03 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.
 - 1. Panel Clips: One piece assembly, 3-1/2 in. wide, 1-7/8 in. high. One panel clip located at each purlin intersection.
 - 2. Fasteners: No. 10-16 by 1 inch long No. 3 self-drilling point, No. 2 Phillips drive head, cadmium plated steel screws. Two screws per clip to be used, inserted through 1/4 inch diameter guide holes.

2.04 FINISHES

- A. Fluoropolymer Coil Coating System: Manufacturer's standard multi-coat aluminum coil coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss to match sample.

2.05 ACCESSORIES

- A. Gable Trim: Prefinished, same material as roof panel, manufacturer's standard profile and color.
- B. Flashing and Trim: 24 gage (0.024 inch) prefinished aluminum.
- C. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- D. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
- E. Sealants:

1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
- B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
- C. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
 2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
- C. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.
 1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by the panel manufacturer.

3.04 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings and counterflashings.
- B. Sealants for joints within sheet metal fabrications.

1.02 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
- B. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2017.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007, with Editorial Revision (2012).
- F. NRCA (RM) - The NRCA Roofing Manual; 2017.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with roofing and waterproofing work for scheduling installation of counterflashing, rain drainage and similar items related to roofing and waterproofing.
 - 2. Coordinate with the work of Section 07 9200 - Joint Sealants for installation of related sealants.
- B. Preinstallation Meeting: Convene one week minimum before starting work of this Section.
 - 1. Require attendance of parties directly concerned with the work of this Section, including those who are required to coordinate with the work, and those who are required to protect the work upon completion. Include the manufacturer's technical representative, Owner and Architect.
 - 2. Review approved submittals.
 - 3. Review preparation and installation procedures and coordinating and scheduling required with related work.
 - 4. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 5. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 - 6. Review requirements for insurance and certificates if applicable.
 - 7. Review sheet metal flashing observation and repair procedures after flashing installation.
- C. Preinstallation Meeting: Convene one week before starting work of this section.

1.04 SUBMITTALS

- A. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
 - 1. Product Data: Submit for each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1. Include plans, elevations, sections, and attachment details. reference details to plans. elevations, and sections. Key details to plans. elevations and sections.
 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 4. Include details for forming, including profiles, shapes, seams, laps, and dimensions.
 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 6. Include details of termination points and assemblies.
 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 8. Include details of roof-penetration flashing.
 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 10. Include details of special conditions.
 11. Include details of connections to adjoining work.
 12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
 3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
- E. Samples: Submit two samples 6 by 6 inch in size illustrating metal finish color.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.
- C. Protect materials before, during, and after installation and protect the work and materials of other trades. Roof surfaces shall be protected from damage.
- D. Deliver only new materials to job site. Materials to be stored in such a manner as to be protected from wind displacement, rain, snow, or inclement weather. When storing materials on the roof, do not overstress the deck.
- E. In the event of damage, immediately make repairs and replacements to approval of Owner and at no additional cost to Owner.
- F. Follow the Manufacturer's recommendations for storage of temperature sensitive materials.

1.07 WARRANTY

- A. New materials and workmanship provided under this section shall be warrantied in writing for two years.

- B. Provide 20 year manufacturer warranty for prefinished sheet metal materials. Warranty shall include degradation of metal finish.
- C. Maintain roof related sheet metal in watertight condition without cost to Owner during warranty period.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-120. Identify materials with name of fabricator and design approved by FM Approvals.
- D. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated on Drawings.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, 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.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
 - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: AS selected by Owner from manufacturer's standard colors.
 - 3. Acceptable Products
 - a. Peterson Aluminum Corporation; PAC-CLAD
 - b. Clad-Tex Metals; TUFFCLAD.
 - c. Ryerson Inc.; ColorKlad.
 - d. Firestone Building Products; UNA-CLAD.
 - e. Approved equal

2.03 ACCESSORIES

- A. Fasteners: Carbon steel with corrosion-resistant coating, unless otherwise noted. Fasteners shall show no more than 15% red rust corrosion after 30 cycles of Kesternich testing.
- B. Masonry / Concrete Fasteners
 - 1. Fasteners shall be threaded or expansion type as required by site conditions.
 - 2. Threaded fasteners shall be corrosion-resistant with hex washer head.
 - 3. Expansion fasteners shall be zinc-alloy jacketed with stainless steel drive pin and mushroom head (nylon or plastic anchors are not approved).
 - 4. Corrosion-resistant, watertight, EPDM sealing washer shall be supplied for either threaded or expansion type fasteners.
 - 5. Fasteners shall be approved by FM Global.
 - 6. Approved Products:
 - a. Tapcon Hex Washer Head with Blue Climaseal or White UltraShield Coating by ITW Buildex
 - b. Tapper with Perma-Seal Coating by Powers Fasteners, Inc.

- c. Metal Hit Anchor by Hilti
 - d. Zamac Hammer-Screw with Carbon Steel Drive Screw by Powers Fasteners, Inc.
 - e. Masonry Anchor by OMG
 - f. Dekfast ZAC Anchor with Sentri XP Coating by SFS Intec, Inc.
 - g. Approved equal
- 7. Fasteners to be nominal 3/8" thickness minimum and of sufficient length to penetrate the masonry/concrete 1".
- C. Steel / Wood Fasteners:
 - 1. Corrosion-resistant, self-drilling, self-tapping screw with hex washer head for exposed fastening.
 - 2. Corrosion-resistant, watertight, EPDM sealing washer for exposed fastening.
 - 3. Approved Products - Steel Fasteners
 - a. Tek Screw with Climaseal Coating by ITW Buildex
 - b. Dekfast ZAC Impax Anchor with Sentri XP Coating by SFS intec, Inc.
 - c. Approved equal
 - 4. Approved Products - Wood Fasteners
 - a. TruGrip GT with Climaseal Coating by ITW Buildex
 - b. Dekfast ZAC Tapping Fastener with Sentri XP Coating by SFS Intec, Inc.
 - c. Approved equal
 - 5. Fasteners to be nominal 1/4" thickness minimum and of sufficient length to penetrate the steel 1/2" or into wood minimum 1-1/2".
 - 6. 1-1/4" x 11-gauge, galvanized, ring shank roofing nails shall be used for concealed fastening into wood.
- D. Sealants and Related Accessories:
 - 1. General: Except as specifically otherwise directed by the Owner's Representative, use only the type of sealants described in this section.
 - a. Silyl-Terminated Polyether (Hybrid) Sealant.
 - 1) Approved Products:
 - (a) Sonolastic 150 VLM by BASF Building Systems.
 - (b) Approved Equal.
 - b. Urethane Sealant:
 - 1) Approved Products:
 - (a) Sonolastic NP-1 by BASF Building Systems.
 - (b) Approved Equal.
 - 2. Cleaner:
 - a. Industrial solvent recommended by the sealant Manufacturer, such as Isopropyl Alcohol, Naphta, Mineral Spirits, Xylol, Toluene, MEK, or Manufacturer-supplied cleaner.
 - 3. Primer:
 - a. General: Use only those primers that are specifically recommended for this installation by the sealant Manufacturer.
 - b. Primer shall be one of the following:
 - 1) Primer 733 BASF Building Systems.
 - 2) Approved Equal.
 - 4. Backer Rod:
 - a. General: Use only those backup materials that are specifically recommended for this installation by the sealant Manufacturer and that are non-absorbent, non-staining, and non-gassing when punctured. Backup materials must be 1-1/2 times the width of joint.
 - b. Backer rod shall be one of the following:
 - 1) Soft Backer-Rod by BASF Building Systems
 - 2) Approved equal
 - c. High Temperature Resistant Sealant

- 1) Trade Mate® Hi-Temp Silicone Sealant by Dow Corning Corporation
- 2) Approved equal
5. Sealant Tape
 - a. Permanently elastic isobutylene tripolymer tape or isobutylene isoprene copolymer tape that will bond to galvanized steel; aluminum; siliconized polyester, and polyvinyl fluoride painted metals; as well as wood, concrete, etc., 1/8" x 1" nominal cross section, meeting Federal Specification TT-C 1796A, Type II, Class B, with minimum 20 psi adhesive tensile strength according to ASTM C 907, with a service temperature range of -60° F to 212° F.
 - 1) Approved Products
 - (a) Sika Lastomer - 95 Gray by Sika Corp.
 - (b) Sika Lastomer - 93 Black by Sika Corp.
 - (c) Sika Lastomer - 65 White by Sika Corp.
- E. Fasteners: Galvanized steel, with soft neoprene washers.
- F. Primer: Zinc chromate type.
- G. Concealed Sealants: Non-curing butyl sealant.
- H. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- I. Plastic Cement: ASTM D4586/D4586M, Type I.

2.04 FABRICATION

- A. Flashing and Counter Flashing:
 1. Fabricate as indicated on Drawings and in accordance with SMACNA Architectural Sheet Metal Manual, Chapter 4.
 2. Hem exposed flashings on underside 1/2 inch; miter and seam corners.
 3. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
 4. Fabricate flashings to allow toe to extend minimum 2 inches over wall surfaces.
 5. Shop fabricate items where practicable.
 6. Obtain field measurements for accurate fit before shop fabrication
- B. Coping:
 1. As indicated on Drawings and in accordance with SMACNA Figure 3-4A.
 - a. Thickness to suit spans and imposed loads with corner seams factory mitered and soldered; fabricate with 24 inch returns.
- C. Fascia/Gravel Stop:
 1. As indicated on Drawings.
 2. Joint system: In accordance with SMACNA Figure 2-5A.
- D. Metal Expansion Joints:
 1. As indicated on Drawings.
 2. Joint system: In accordance with SMACNA Figure 2-5A.
- E. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- F. Form pieces in longest possible lengths.
- G. Provide counterflashing where indicated on drawings. Form counterflashing sections not less than 8 feet in length, unless otherwise approved prior to fabrication and installation. Counterflashing shall overlap base flashing a minimum of 3 inches.
- H. Coping caps and edge metal shall be furnished where indicated on drawings. Form coping and edge metal in sections not less than 8 feet long in, unless otherwise approved prior to fabrication and installation.
- I. Where loose lock lap joints are specified on the drawings, adjacent sections of metal shall overlap a minimum of 3 inches.

- J. Where joint covers are specified on the Drawings, they shall be slightly larger than the primary component to ensure a proper fit. Edges of joint covers shall be tipped toward primary component to form a compression seal.
- K. Miter inside and outside corner joints in coping caps, edge metal, and expansion joints. Joints adjacent to inside and outside corners shall be placed exactly 24 inches each direction from the corner, unless otherwise approved prior to fabrication and installation.
- L. Break counterflashing, coping cap, or edge metal sections where they cross building expansion joints, if applicable.
- M. Horizontal flanges of edge metal, lead flashings, pitch pans, lower flanges, pipe jacks, etc., shall be 4" minimum with rounded corners.
- N. Exposed edges of cut sheet metal shall be folded back on concealed surfaces.
- O. Form, fabricate, and install all sheet metal so as to adequately provide for expansion and contraction in the finished work.
- P. Continuous clips shall be fabricated using metal material of greater thickness than the components being secured.
- Q. Where a continuous clip is specified on the drawings, the primary component shall be continuously crimped along the bottom edge of the clip.
- R. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- S. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- T. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with Solder unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
 - 1. Tin edges to be seamed, form seams, and solder.
 - a. Solder
 - 1) Mechanically fasten and solder and seal metal joints except those indicated or required to be expansive type joints.
 - 2) After soldering, remove flux. Wipe and wash solder joints clean.
 - 3) Do not use graphite pencils to mark metal surfaces.
- U. Provide for thermal expansion/contraction of all exposed sheet metal work exceeding 15 feet in running length, except as otherwise indicated.
- V. Dissimilar materials in contact, which are subject to electrolysis, shall be protected against such action prior to installation. Protective materials shall not be visible after installation. Protect metals using coatings recommended by Manufacturer, or separate using felt or EPDM membrane.
- W. Finish all sheet metal watertight and weathertight where so required.
- X. Where lap seams do not have a joint cover, lap 3" minimum according to pitch.
- Y. Make all lap seams in the direction of the water flow.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.
- C. Verify that work by other trades has been completed prior to installing roof related sheet metal work.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Join parts with rivets or sheet metal screws where necessary for strength or stiffness.
- B. Provide suitable watertight expansion joints for all sheet metal as required for proper installation in accordance with the schedule of roof related sheet metal and detail drawings.
- C. Sealant application shall be neatly and thoroughly performed for a watertight seal. Sealant shall be installed within all loose lock joints, under joint cover plates, and in other locations shown on the drawings. All exposed sealant joints shall be dry tooled to the profile shown on the detail drawings. If required, Contractor shall build custom tools on job site to provide the specified profile(s).
- D. Surfaces to receive sealant shall be thoroughly cleaned as recommended by the sealant Manufacturer. All bitumen coating materials, roof cement, adhesive residue, rust, old caulking and/or other contaminants shall be removed down to the substrate to which sealant bonding is intended.
- E. All surfaces to receive sealant shall be primed initially with the sealant Manufacturer's recommended primer.
- F. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
- G. Apply plastic cement compound between metal flashings and felt flashings.
- H. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- I. Seal metal joints watertight.
- J. Slope gutters 1/4 inch per 10 feet, minimum.
- K. Connect downspouts to downspout boots, and grout connection watertight.
- L. Secure metal as per detail drawings. Do not in any case install exposed fasteners on a horizontal plane, unless specifically shown on a particular detail drawing.
- M. All clips and cleats are to be fastened 6 inches o.c., unless otherwise noted on the drawings.
- N. Do not fasten adjacent coping, counterflashing, or edge metal sections together at laps or at joint covers, so as to limit expansion/contraction ability. Fasten through center of joint cover through butt joint gap between primary component sections.
- O. Embedded metal flanges are to be fastened 3 inches o.c., staggered.
- P. The specified spacings for all fasteners in perimeter metal work shall be reduced by a factor of two in the corner zones of each roof section. Corner zones shall be as calculated based upon the applicable version of ASCE-7.
- Q. For concealed fastening into wood, use annular ring shank roofing nails.
- R. For fastening into concrete, use masonry/concrete anchors with EPDM washers. Use only metal anchors. Plastic or nylon anchors shall not be used.
- S. For exposed fastening into wood, use screws with EPDM washers. Deformed shank nails shall not be used.
- T. Ensure that fasteners are not overdriven such that EPDM washer damage results. Remove and replace all such damaged fasteners, using oversized fasteners.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for field inspection requirements.
- B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

- C. Inspect the work described by this section to verify that components are complete and properly installed.
- D. Correct deficient work prior to installing subsequent work or notification of completion.

3.05 PROTECTION

- A. Roof surfaces and flashing shall be adequately protected to prevent damage during the installation of metal work or during storage of the required materials. The Contractor shall replace any damaged construction, at no cost to the Owner.

3.06 CLEANING

- A. Debris from sheet metal work shall be frequently removed from building site as it accumulates.
- B. Leave job site absolutely clean at completion of work, and properly dispose of all construction debris such as metal trimmings, fasteners, rivet nails, sealant tube ends, etc.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.
- B. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015a.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014a.
- D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- F. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- G. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.
- H. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.
- I. SWRI (VAL) - SWR Institute Validated Products Directory; Current Listings at www.swrionline.org.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
- B. Convene pre-installation conference 3 weeks prior to commencing work of this Section.
- C. Conference Purpose and Agenda:
 - 1. Required Attendance: Contractor's quality control supervisor or superintendent, Architect, affected trades, and sealant manufacturer.
 - 2. Visit Project site to analyze site conditions, and inspect surfaces and joints to be sealed in order that recommendations may be made should adverse conditions exist.
 - 3. Review mock-up and field sample.
 - 4. Discuss following items:
 - a. Approved submittals.
 - b. Substrate conditions.
 - c. Preparatory work.
 - d. Weather conditions under which work will be done.
 - e. Anticipated frequency and extent of joint movement.
 - f. Joint design.
 - g. Sealant installation procedures.

1.04 SUBMITTALS

- A. Action Submittals
 - 1. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - a. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - b. List of backing materials approved for use with the specific product.
 - c. Substrates that product is known to satisfactorily adhere to and with which it is compatible.

- d. Substrates the product should not be used on.
 - e. Substrates for which use of primer is required.
 - f. Substrates for which laboratory adhesion and/or compatibility testing is required.
 - g. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
 - h. Sample product warranty.
 - i. Certification by manufacturer indicating that product complies with specification requirements.
 - j. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
 - k. Product test reports: For sealant, based on evaluation of comprehensive tests performed by a qualified testing agency including applicable lab testing for substrates on project.
- 2. Shop Drawings: In schedule form including:
 - a. Joint location and designation.
 - b. Product manufacturer, name, formulation, and color
 - c. Detailed drawings for each installation condition, including joint conditions, sealant profiles, backings, substrates, and other application related information; manufacturer's standard drawing details are acceptable if necessary information is conveyed.
 - 3. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
 - 4. Initial samples of cured sealants indicating full range of colors available.
 - 5. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- B. Informational Submittals:
- 1. Certificate: Certify that products meet or exceed specified requirements.
 - a. Manufacturer's Project Acceptance Document: Certification that manufacturer and installer will warrant sealant for specific site, design, details, and application indicated for this project.
 - b. Installer Certification: Written document from Manufacturer stating installer is certified, approved, licensed, or acceptable to install specified products.
 - 2. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
 - 3. Installation Plan: Submit at least four weeks prior to start of installation.
 - 4. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
 - 5. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
 - 6. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
 - 7. Installation Log: Submit filled out log for each length or instance of sealant installed.
 - 8. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
 - 9. Manufacturer and Installer qualification.
 - 10. Warranties: Sample of special warranties.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 01 8114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 20 years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience and approved by manufacturer.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- E. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Stain Testing: In accordance with ASTM C1248; required only for stone substrates.
 - 4. Allow sufficient time for testing to avoid delaying the work.
 - 5. Deliver to manufacturer sufficient samples for testing.
 - 6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 7. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility with project specific substrates.
- F. Installation Plan: Include schedule of sealed joints, including the following:
 - 1. Joint width indicated in Contract Documents.
 - 2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
 - 3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
 - 4. Approximate date of installation, for evaluation of thermal movement influence.
 - 5. Installation Log Form: Include the following data fields, with known information filled out.
 - a. Unique identification of each length or instance of sealant installed.
 - b. Location on project.
 - c. Substrates.
 - d. Sealant used.
 - e. Stated movement capability of sealant.
 - f. Primer to be used, or indicate as "No primer" used.
 - g. Size and actual backing material used.
 - h. Date of installation.
 - i. Name of installer.
 - j. Actual joint width; provide space to indicate maximum and minimum width.
 - k. Actual joint depth to face of backing material at centerline of joint.
 - l. Air temperature.
- G. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
 - 1. Identification of testing agency.
 - 2. Name(s) of sealant manufacturers' field representatives who will be observing
 - 3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
 - b. Test date.
 - c. Location on project.

- d. Sealant used.
 - e. Stated movement capability of sealant.
 - f. Test method used.
 - g. Date of installation of field sample to be tested.
 - h. Date of test.
 - i. Copy of test method documents.
 - j. Age of sealant upon date of testing.
 - k. Test results, modeled after the sample form in the test method document.
 - l. Indicate use of photographic record of test.
- H. Field Quality Control Plan:
- 1. Visual inspection of entire length of sealant joints.
 - 2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
 - a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
 - b. If any failures occur in the first 10 linear feet, continue testing at 12 inch intervals at no extra cost to Owner.
 - 3. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
 - a. For each different sealant and substrate combination, allow for one test every 100 feet in the first 1000 linear feet, and one test per 1000 linear feet thereafter, or once per floor on each elevation.
 - b. If any failures occur in the first 1000 linear feet, continue testing at frequency of one test per 500 linear feet at no extra cost to Owner.
 - 4. Field testing agency's qualifications.
 - 5. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- I. Field Adhesion Test Procedures:
- 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 - 2. Have a copy of the test method document available during tests.
 - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 - 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
 - 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
 - 6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- J. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
- 1. Record results on Field Quality Control Log.
 - 2. Repair failed portions of joints.
- K. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
- 1. Sample: At least 18 inch long.
 - 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
 - 3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

4. Record results on Field Quality Control Log.
5. Repair failed portions of joints.
- L. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING.

- A. Deliver materials to Project site in original unopened containers or bundles with manufacturer's labels. Labels on delivered materials shall show manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to prevent their deterioration or damage due to moisture , temperature changes, contaminants or other causes.

1.08 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
- B. Weather Conditions: Proceed with work only when existing and forecasted weather conditions permit installation according to manufacturer's instructions and warranty requirements.

1.09 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace non-silicone joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Silicone Sealants: 20 years from date of Substantial Completion.
 2. Urethane Sealants: 5 years from date of Substantial Completion.
 3. Others: 2 years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
- D. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.

- b. Joints between different exposed materials.
 - c. Other joints indicated below.
- 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - 1) Exception: Such gaps and openings in gypsum board finished stud walls and suspended ceilings.
 - 2) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
 - c. Other joints indicated below.
- 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag non-staining silicone sealant, unless otherwise indicated.

2.02 JOINT SEALANTS - GENERAL

- A. Sealants: Only use sealants that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168, CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
 - 1. Current requirement refers to the date on which the materials are installed in the building.
 - 2. A copy of SCAQMD Rule #1168 is referenced in Section 01 8114 - Sustainable Design Requirements - CAL-Green that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
- B. Colors: As indicated on drawings.

2.03 NONSAG JOINT SEALANTS

- A. Type JS-5 Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT, G, A, and O.
 - 1. General purpose, metal to metal joints.
 - 2. Acceptable Products:
 - a. Dow Corning Corporation; 795.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS2000 SilPruf.
 - c. Sika Corporation; Sikasil WS-295: www.usa-sika.com.
 - d. Tremco; Spectrum 2.
 - e. Prior approved equal.
- B. Type JS-3 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses NT, G, M, A and O; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 - 4. Color: To be selected by Architect from manufacturer's standard range.
 - 5. Cure Type: Single-component, neutral moisture curing.
 - 6. Service Temperature Range: Minus 65 to 180 degrees F.

7. Acceptable Products:
 - a. Dow Corning Corporation; 756 SMS Building Sealant: www.dowcorning.com.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; SilPruf NB.
 - c. Pecora Corporation; 890NST Ultra Low Modulus Architectural Silicone Sealant - Class 100: www.pecora.com.
 - d. Tremco Incorporated; Spectrem 2.
 - e. Pecora Corporation; 895NST Medium Modulus Structural Glazing & Weatherproofing Silicone Sealant - Class 50: www.pecora.com.
 - f. Sika Corporation; Sikasil WS-290: www.usa-sika.com.
 - g. Sika Corporation; Sikasil WS-295: www.usa-sika.com.
 - h. Sika Corporation; Sikasil 728NS: www.usa-sika.com.
 - i. Prior approved equal.
- C. Type JS-6 - Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus 100 percent, minus 50 percent.
 2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 3. Color: To be selected by Architect from manufacturer's standard range.
 4. Cure Type: Single-component, neutral moisture curing
 5. Service Temperature Range: Minus 65 to 180 degrees F.
 6. Acceptable Products:
 - a. Dow Corning Corporation; 758 Silicone Weather Barrier Sealant: www.dowcorning.com.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; SSG4000 UltraGlaze.
 - c. Polymeric Systems, Inc.; PSI-631.
 - d. Schnee-Morehead, Inc., an ITW company; SM5731 Poly-Glaze Plus.
 - e. Sika Corporation; Sikasil-N Plus: www.usa-sika.com.
- D. Type JS-4 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 1. Color: As selected by Architect from manufacturer's full range.
 2. Acceptable Products:
 - a. Dow Corning Corporation; 786-M White.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
 - c. Pecora Corporation; 898NST Sanitary Silicone Sealant - Class 50: www.pecora.com.
 - d. Tremco Incorporated; Tremsil 200.
- E. Type JS-4 Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 1. Acceptable Products:
 - a. BASF Building Systems; Sonolastic Ultra.
 - b. Pecora Corporation; Dynatrol I-XL.
 - c. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - d. Tremco Incorporated; Dymonic.
- F. Type JS-1 Urethane, Immersible, M, P, 25, T, NT, I: Immersible nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T, M, O. Shore A Hardness: 40 minimum, when tested in accordance with ASTM C661.
 1. Acceptable Products:
 - a. Pecora; NR-201.
 - b. Sika Corporation; Sikaflex 15 LM SL.
 - c. Sonneborn; Sikaflex-2C SL.
 - d. Tremco; Vulkem 245.

- G. Type JS-2 Urethane, S, P, 25, T, NT: Pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T, M, O.
 - 1. Acceptable Products:
 - a. BASF Building Systems; MasterSeal SL 1.
 - b. Bostik, Inc.; Chem-Calk 950.
 - c. May National Associates, Inc.; Bondaflex PUR 35 SL.
 - d. Pecora Corporation; NR-201.
 - e. Sika; Sikaflex-2C SL.
 - f. Tremco; Vulkem 245.
- H. Type JS-1 Urethane, Immersible, M, P, 25, T, NT, I: Immersible nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T, M, O. Shore A Hardness: 40 minimum, when tested in accordance with ASTM C661.
 - 1. Acceptable Products:
 - a. Pecora; NR-201.
 - b. Sika Corporation; Sikaflex 15 LM SL.
 - c. Sonneborn; Sikaflex-2C SL.
 - d. Tremco; Vulkem 245.
- I. Type JS-7 Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Acceptable Products:
 - a. BASF Building Systems; Sonolac.
 - b. Bostik, Inc.; Chem-Calk 600.
 - c. May National Associates, Inc.; Bondaflex Sil-A 700.
 - d. Pecora Corporation, AC-20.
 - e. Sonneborn Building Products, Sonolac.
 - f. Schnee-Morehead, Inc.; SM 8200
 - g. Tremco, Inc., Acrylic Latex Tremflex 834.

2.04 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Closed Cell: 25 to 33 percent larger in diameter than joint width.
 - a. Location: Exterior.
- B. Bond Breaker Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
 - 1. Pressure sensitive polyethylene tape or tetrafluorethylene self-adhesive tape required by sealant manufacturer to suit application.
 - 2. Minimum Thickness of 11 mils.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.
 - 1. Non-staining to joint substrate beyond the substrate surface.
 - 2. Required for use unless not required by results of:
 - a. "Manufacturer's sealant-substrate compatibility and adhesion test" described under Source Quality Control.
 - b. "Field hand-pull adhesion test" under Field Quality Control.
- F. Tooling Liquids: Non-staining material approved by manufacturer to reduce adhesion of sealant to joint finishing tools.

2.05 SOURCE QUALITY CONTROL

- A. Tests:
 - 1. Coordinate testing of sealant compatibility and adhesion to:
 - a. Sealant backing materials.
 - b. Metals specified in Section 07 4113 - Metal Roof Panels.
 - c. Metals specified in Section 07 4213 - Metal Wall Panels.
 - d. Entrance system specified in Section 08 4313 - Aluminum-Framed Storefronts.
 - e. Tile specified in Section 09 3000 - Tiling.
 - 2. Manufacturer's Sealant-Substrate Compatibility and Adhesion Test:
 - a. Test Methods:
 - 1) Determine if priming and other specific joint preparation techniques are not required to obtain rapid, optimum adhesion of sealants to joint substrates.
 - 2) Comply with ASTM C510, ASTM C794, and ASTM C1087.
 - b. Submit not less than 9 pieces, 3 by 5 inches in size of each type of material, including joint substrates, shims, sealant backing, and miscellaneous materials.
 - c. Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.
 - d. Investigate sealant material's failing compatibility/adhesion tests and obtain manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 - e. Include in Test Report, Manufacturer's:
 - 1) Interpretation of test results regarding sealant performance.
 - 2) Primers and substrate preparation required to achieve adhesion.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 - 2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.
 - 3. Arrange for sealant manufacturer's technical representative to be present during tests.
 - 4. Record each test on Preinstallation Adhesion Test Log as indicated.
 - 5. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
 - 6. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.
- E. Provide isolation joints where necessary to prevent surface cracking of concrete topping
- F. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
 - 1. Prime joint substrates unless priming is not required by:
 - a. "Manufacturer's sealant-substrate compatibility and adhesion test" described in Source Quality Control article.
 - b. "Field hand-pull adhesion test" described in Field Quality Control article.
 - 2. Apply primer to substrate areas where joint sealant is to adhere.
 - 3. 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.
 - 4. Do not allow spillage and migration of primer onto surfaces not to receive primer.
 - 5. Install sealant to primed substrates after primer has cured.
- E. 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.
 - 4. Install closed cell backings at exterior locations.
 - 5. Install open cell backings at interior locations.
- F. Install bond breaker backing tape where backer rod cannot be used.
- G. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- H. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- I. 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.
- J. 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 per Figure 8A in ASTM C 1193 unless otherwise indicated.

4. Provide flush joint profile at locations indicated on Drawings and according to Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings and according to Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- K. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- L. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- C. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.
- D. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
- E. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.
- F. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
- G. Repair destructive test location damage immediately after evaluation and recording of results.

3.05 CLEANING AND CURING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- B. Cure sealants in compliance with manufacturer's instructions and recommendations to obtain high early-bond strength, internal cohesive strength, and surface durability.

3.06 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.07 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

3.08 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces JS-1.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between plant-precast architectural concrete paving units.
 - c. Joints in stone paving units, including steps.
 - d. Tile control and expansion joints.
 - e. Joints between different materials listed above.
 - f. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, M, P, 50, T, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces JS-2.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, S, P, 25, T, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-3.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete, natural stone.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between different materials listed above.
 - d. Control and expansion joints in overhead surfaces.
 - e. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-4.
 - 1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints in bathrooms, public restrooms, and where indicated.

- c. Other joints as indicated on Drawings.
- 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
- 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: General purpose JS-5.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints in glass unit masonry assemblies.
 - d. Joints between metal panels.
 - e. Joints between different materials listed above.
 - f. Control and expansion joints in overhead surfaces.
 - g. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Weather barriers JS-6.
 - 1. Joint Locations:
 - a. Construction joints in weather barriers.
 - b. Joints between weather barrier and other materials.
 - 2. Joint Sealant: Silicone, nonstaining, NS, M and A.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement JS-7.
 - 1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors, wood trim, millwork, windows and elevator entrances.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Acrylic latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI: American National Standards Institute.
- B. ASCE: American Society of Civil Engineers.
- C. HMMA: Hollow Metal Manufacturers Association.
- D. NAAMM: National Association of Architectural Metal Manufacturers.
- E. NFPA: National Fire Protection Association.
- F. SDI: Steel Door Institute.
- G. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2018.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2016.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- O. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.
- P. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.

1.05 ADMINISTRATIVE REQUIREMENTS

1.06 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- C. Samples: Submit two samples of metal, 2 inch by 2 inch in size showing factory finishes, colors, and surface texture.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: www.steeldoors.org/sdicertified.php/#sle.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturers:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
 - a. Flush Panel Doors: Ceco; Regent.
 - b. Style and Rail Doors: Ceco; ThruLite.
 - 2. Other Acceptable Manufacturers:
 - a. Amweld Building Products, Inc.: www.amweld.com.
 - b. ASSA ABLOY, Curries: www.assaabloydss.com.
 - c. Pioneer Industries : www.pioneerindustries.com.
 - d. Republic Doors: www.republicdoor.com.
 - e. Steelcraft, an Allegion brand: www.allegion.com/us.
 - f. Amweld Building Products, Inc.: www.amweld.com.
 - g. Deansteel Manufacturing, Inc.: www.deansteel.com.
 - h. Krieger Steel Products: www.kriegersteel.com.
 - i. Prior approved equal.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.

2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 4. Door Edge Profile: Manufacturers standard for application indicated.
 5. Typical Door Face Sheets: Flush.
 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI (DM) Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Interior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 2 - Seamless.
 - d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
 2. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
 2. Frame Finish: Factory primed and field finished.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 FRAME ANCHORS

- A. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) 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.
- B. Jamb Anchors:
1. Masonry Type: Wire anchors not less than 0.177 inch thick.
 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

- C. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Adjustable-type anchors with two holes to receive fasteners.

2.07 ACCESSORIES

- A. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- B. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- C. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
- D. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 08 7100 - Door Hardware.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3613
SECTIONAL DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulated rolling steel doors at the exterior dock door locations, manually operated.
- B. Operating hardware and supports.

1.02 REFERENCE STANDARDS

- A. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- B. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; 2011.
- C. ITS (DIR) - Directory of Listed Products; current edition.
- D. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

- A. Product Data: Show component construction, anchorage method, and hardware.
 - 1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
 - 1. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 3. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For units with factory-applied finishes.
 - 1. Include Samples of accessories involving color selection.
- D. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Operation Data: Include normal operation, troubleshooting, and adjusting.
- H. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- I. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 WIND PERFORMANCE REQUIREMENTS

- A. Design doors to withstand positive and negative wind loads as calculated in accordance with applicable governing building codes. Door must meet 25 psf Design Pressure.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

- C. Comply with applicable code for motor and motor control requirements.
- D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

1.06 WARRANTY

- A. Correct defective Work within a 10 year period after Date of Substantial Completion.
- B. Warranty: Include coverage for electric motor and transmission.
- C. Provide five year manufacturer warranty for electric operating equipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Sectional Doors:
 - 1. Overhead Door Corporation; 591 Series Thermacore Insulated Steel Doors: www.overheaddoor.com.
 - 2. Substitutions: Approved Equal - See Section 01 6000 - Product Requirements.

2.02 STEEL DOORS

- A. Provide each door with door sections, brackets, tracks, counterbalance mechanisms and hardware to suit the opening and headroom available.
- B. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
 - 1. Door Nominal Thickness: 2 inches thick.
 - 2. Exterior Surface: Ribbed, textured.
 - 3. Exterior Steel: 0.15 inch, hot-dipped galvanized, roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
 - 4. End Stiles: 16 gage, 0.0508 inch.
 - 5. Center Stiles: 14 gage, .078125 inch.
 - 6. Thermal Transmittance: U-factor of .107 Btu/hr sq ft degrees F, maximum, in accordance with DASMA 102.
 - 7. Air Leakage Rate: Less than 0.08 cfm/sf when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf.
 - 8. Exterior Finish: Factory finished with acrylic baked enamel; color as selected by Owner from manufacturers full range.
 - 9. Interior Finish: Factory finished with acrylic baked enamel; color as selected by Owner from manufacturers full range.
 - 10. Manual Operation: Pull rope.
- C. Window Frame: Manufacturers standard, finish to match.
- D. Glazing: Polycarbonate; single pane; clear; 1/8 inch thick.
 - 1. Provide two 5 inch by 24 inch opening for each door with vision lites.

2.03 COMPONENTS

- A. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- B. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
 - 1. For Manual Operation: Requiring maximum exertion of 25 lbs force to open.
- C. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
 - 1. High cycle spring: 100,000 cycles.
- D. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.

1. Size: 2 inches or 3", as required.
 2. Track: Vertical Lift "Break Away" type.
- E. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- F. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- G. Head Weatherstripping: EPDM rubber seal, one piece full length.
- H. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- I. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

3.03 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Install perimeter trim.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

3.05 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.
- B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.06 CLEANING

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Acoustic insulation.
- D. Cementitious backing board.
- E. Gypsum wallboard.
- F. Joint treatment and accessories.
- G. Acoustic (sound-dampening) wall and ceiling board.

1.02 REFERENCE STANDARDS

- A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
- B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- D. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014, with Editorial Revision (2015).
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2017.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2018b.
- H. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- J. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- K. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- L. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- M. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel; 2017.
- N. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2018.
- O. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2014.
- P. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- Q. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2018a.
- R. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2018.

- S. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- T. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- U. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- V. GA-216 - Application and Finishing of Gypsum Panel Products; 2016.
- W. GA-600 - Fire Resistance Design Manual; 2015.
- X. ICC (IBC) - International Building Code; 2015.
- Y. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.
- Z. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with mechanical and electrical work. Do not attach or support metal framing to ducts, pipes, conduit, or similar items.
 - 2. Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.
 - 3. Coordinate with installation of sprayed-on fireproofing to minimize or eliminate damage to that work due to gypsum board systems installation.
 - 4. Coordinate gypsum board work with requirements of Section 07 8400 - Firestopping to maintain integrity of fire-rated and smoke-rated partitions required to comply with specified regulatory requirements.

1.04 SUBMITTALS

- A. Action Submittals
 - 1. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
 - 2. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
 - 3. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
 - 4. Samples: Submit Three samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.
- B. Informational Submittals
 - 1. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 01 8114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.
- B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Stud Framing: Products that do not comply with ASTM C645 or C754 are not permitted.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products in accordance with referenced standards.
- B. Handle gypsum boards to prevent damage to ends, edges, and surfaces.

1.08 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
- D. Maintain ambient temperatures at not less than 40 deg F for non-adhesive attachment of gypsum board, and not less than 50 deg F for adhesive attachment.
- E. Maintain ambient temperatures at not less than 50 deg F for a period 48 hours before gypsum board finishing, during installation, and after installation of board materials.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLY PERFORMANCE REQUIREMENTS

- A. Design Requirements: Contractor is responsible for designing metal framing used to comply with performance requirements, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
- B. Performance Requirements:
 - 1. Interior Suspended Gypsum Board Ceilings, Soffits, and Bulkheads: Design and install to provide deflection of not more than 1/360 of distance between supports.
 - 2. Interior Metal Stud/Gypsum Board Assemblies: Design and install to withstand lateral loading (air pressure) of 5 PSF with deflection limit not more than 1/240 of partition height.
 - 3. Interior Metal Stud/Gypsum Board Assemblies at Locations with Ceramic Tile or Other Hard Surface Finishes: Design and install to withstand lateral loading (air pressure) with deflection limit not more than L/360 of partition height.
 - 4. Where documents indicate a stud size, size shall be considered minimum. Increase gage to meet minimum performance requirements.
 - 5. Accommodate building structure deflections in connections to structure.
- C. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
 - 1. Construct assemblies identical to those indicated by reference to GA 600 or to design designations listed by Factory Mutual, Underwriters Laboratories, Warnock Hersey, or listing of other agencies acceptable to authorities having jurisdiction.
 - 2. Provide partition head assemblies for fire-rated full height partitions that have been successfully tested to accommodate deck deflection.
- D. Provide completed assemblies complying with ASTM C840 and GA-216.
- E. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
 - 2. Provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- F. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:

1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- G. Fire Rated Assemblies: Provide completed assemblies specified on Drawings.
1. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
 2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).
 4. Where any specified rated assembly requires the use of proprietary gypsum board system products, installation methods or procedures, comply with specified rated assembly requirements including requirements associated with assembly options which may be selected by Contractor.

2.02 BOARD MATERIALS

- A. Acceptable Manufacturers - Gypsum-Based Board:
1. CertainTeed Corporation: www.certainteed.com.
 2. Georgia-Pacific Building Products: www.gpgypsum.com.
 3. National Gypsum Company: www.nationalgypsum.com.
 4. PABCO Gypsum: www.pabco gypsum.com.
 5. USG Corporation: www.usg.com.
 6. American Gypsum Company: www.americangypsum.com.
- B. Board Materials - General:
1. Maximize use of recycled or synthetic gypsum with minimum of 10 percent.
 2. Comply with ASTM C1396.
 3. Type X or manufacturer's proprietary fire rated core for fire rated assemblies and locations where indicated; regular type at other assemblies.
 4. Maximum available lengths to minimize end-to-end butt joints, square cut ends, tapered edge.
 5. Thickness: 5/8 inch, except where indicated otherwise
- C. Gypsum Board: Gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Applications: Use for vertical surfaces, unless otherwise indicated.
 2. Thickness: As indicated on Drawings.
 - a. Vertical Surfaces: 5/8 inch.
 - b. Multi-Layer Assemblies: Thicknesses as indicated on Drawings.
 3. Acceptable Mold-Resistant Paper-Faced Products:
 - a. Location: Toilet room areas without tile and as indicated on Drawings.
 - b. Acceptable Products:
 - 1) American Gypsum Company; M-Bloc.
 - 2) CertainTeed, Proroc Moisture And Mold Resistant With M2tech.
 - 3) Continental Building Products; Mold Defense Type X.
 - 4) National Gypsum Company; XP Wallboard.
 - 5) USG, Sheetrock Brand Mold Tough.
 - 6) Prior approved equal.
- D. Gypsum Board Type X: Gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Applications: Use for fire rated vertical surfaces and ceilings, unless otherwise indicated.
 2. Thickness: As indicated on Drawings.
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.

- c. Multi-Layer Assemblies: Thicknesses as indicated on Drawings.
- E. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.
 - 1. Applications: Rated ceilings, unless otherwise indicated.
 - 2. Thickness: 5/8 inch.
 - 3. Long Edges: Tapered.
 - 4. Basis of Design Product:
 - a. American Gypsum; 5/8" FireBloc Type C Gypsum Wallboard.
 - b. CertainTeed Corporation; ProRoc Type C.
 - c. Georgia-Pacific Gypsum; Fireguard C.
 - d. National Gypsum Company; Gold Bond Fire-Shield C.
 - e. Pacific Coast Building Products, Inc.; Flame Curb Type Super C.
 - f. USG Corporation; USG Sheetrock Brand Firecode C Gypsum Panels.
- F. Backing Board For Wet Areas:
 - 1. Applications: Surfaces behind tile in wet areas including toilet rooms.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Glass-Mat-Faced Backing Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Fire-Resistant Type Thickness: Type X core, 5/8 inch.
 - b. Use in shower and wet wall areas as shower substrate.
 - c. Acceptable Products:
 - 1) CertainTeed Corporation; Diamondback 1/2" Tile Backer.
 - 2) Georgia-Pacific Gypsum; DensShield FireGuard Tile Backer.
 - 3) National Gypsum Company; Gold Bond eXP Tile Backer.
 - 4) USG Corporation; Fiberock Tile backerboard.
- G. Backing Board For Non-Wet Areas and Ceilings in Wet Areas: Moisture and mold resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
 - 1. Applications: Tile walls in "non- wet" areas.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 4. Type: Regular and Type X, in locations indicated.
 - a. Thickness: 5/8 inch.
 - 5. Thickness: As indicated on Drawings.
 - 6. Edges: Tapered.
 - 7. Acceptable Products:
 - a. American Gypsum Company; M-Bloc.
 - b. American Gypsum Company; M-Bloc Type X.
 - c. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board.
 - d. National Gypsum Company; Gold Bond XP Gypsum Board.
 - e. Lafarge North America Inc.; Mold Defense Drywall.
 - f. Pacific Coast Building Products, Inc.; PABCO Mold Curb Gypsum Wallboard.
 - g. USG Corporation; USG Sheetrock Brand Mold Tough Panels.
- H. Exterior Gypsum Sheathing Board: Sizes to minimize joints in place; ends square cut.
 - 1. Applications: Exterior sheathing and parapet sheathing, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Glass-Mat-Faced Sheathing Board: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 - 4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 5. Thickness: As indicated on Drawings.
 - 6. Edges: V-shaped tongue and groove, for horizontal application.

- I. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
 - 1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
 - 2. Acceptable Products:
 - a. American Gypsum Company; Shaft Liner.
 - b. CertainTeed Corporation; ProRoc Shaftliner.
 - c. Georgia-Pacific Gypsum; ToughRock Fireguard Shaftliner.
 - d. National Gypsum Company; Gold Bond Fire-Shield Shaftliner XP.
 - e. Pacific Coast Building Products, Inc.; PABCORE Gypsum Shaftliner Board type X.
 - f. USG Corporation; Gypsum Liner Panels

2.03 GYPSUM WALLBOARD ACCESSORIES

- A. Acoustic Insulation: As specified in Section 09 8100 - Acoustic Insulation.
- B. Acoustic Sealant: As specified in Section 07 9219 - Acoustical Joint Sealants.
- C. Isolation Strip at Exterior Walls or as Indicated on Drawings: Provide the following:
 - 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.
- D. Water-Resistive Barrier: As specified in Section 07 2500.
- E. Finishing Accessories: ASTM C1047, galvanized steel, unless otherwise indicated.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide L-bead and LC-bead at exposed panel edges.
 - 3. Acceptable Manufacturers:
 - a. Same manufacturer as framing materials.
 - 4. Control Joints: One-piece, v-grooved control joint with integral perforated flanges; removable tape to protect v-groove during finishing.
 - a. Applications: Locations specifically noted on Drawings; also located at internal corners, wall locations at re-entrant soffit corners, and ceiling locations at re-entrant soffit corners whether or not specifically noted on Drawings.
- F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners at glass mat panels.
 - 2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 3. Board manufacturer's standard ready-mixed joint compounds low-VOC joint compounds with no detectable amounts of crystalline silica based on NIOSH Method 7500.
 - 4. Compounds specifically manufactured for topping coats are not permitted for first coat on metal trim and taping.
 - 5. Ready-mixed vinyl-based joint compound at indicated applications.
 - 6. Joint Treatment for Cementitious Backer Board: Minimum 2 inch wide open mesh glass fiber tape acceptable to board manufacturer and tile manufacturer.
- G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
 - 1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
 - 2. Type G screws for gypsum board to gypsum board.
 - 3. Type W screws for wood framing; nails not permitted.
 - 4. Type S, S-12 or W steel screws used to attach panels to studs or furring channels:
 - a. Single Layer Systems: 1 inch long for 1/2 inch and 5/8 inch thick panels or 1-1/4 inches long for 3/4 inch thick panels, spaced 8 inches o.c. when panels are applied

- horizontally, or 8 inch o.c. along vertical and bottom edges and 12 inches o.c. in the field when panels are applied vertically.
- b. Two Layer Systems:
 - 1) First Layer: 1 inch long for 1/2 inch and 5/8 inch thick panels or 1-1/4 inches long for 3/4 inch thick panels, spaced 16 inches o.c.
 - 2) Second layer: 1-5/8 inches long for 1/2 inch, 5/8 inch thick panels or 2-1/4 inch long for 5/8 inch thick panels, spaced 16 inches o.c. with screws offset 8 inches from first layer.
- H. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
 - 1. Product Type 1:
 - a. Hilti, Inc.; Hilti Low-Velocity Power-Actuated Fasteners.
 - b. Code Approvals:
 - 1) ICC ESR 1663.
 - 2) LARR 25646.
 - 2. Product Type 2:
 - a. Hilti, Inc.; Hilti Low-Velocity X-U and X-U 15 Universal Power-Actuated Fasteners.
 - b. Code Approvals:
 - 1) ICC ESR 2669.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this Section before commencing work of this Section.
- B. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- C. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- D. Verify rough-in utilities and blocking are in proper position.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Furnish concrete inserts, steel deck hanger clips, and similar devices to other trades for installation well in advance of time needed for coordination with other work.

3.03 SHAFT WALL INSTALLATION

- A. Shaft Wall Stud Framing: Install in accordance with GA-600 requirements.
 - 1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
 - 2. Install studs at spacing required to meet performance requirements.
- B. Shaftwall Coreboard: Cut panels to accurate dimension and install sequentially between special friction studs.
 - 1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
 - 2. Seal perimeter of shaft wall and penetrations with acoustical sealant.
- C. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- D. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.

- E. At elevator shafts where shaft system cannot be positioned within 2 inches of structural beams, floor edges and similar projections into shaft, provide 5/8 inch gypsum board cants to cover tops of projections. Slope not more than 15 degrees from vertical. Set base edge in drywall adhesive and secure top with screws at 24 inches on center maximum.
- F. Seal perimeter of shaftwall work where it abuts other work following requirements of Section 07 8400 - Firestopping for firestopping and fire-resistive joint sealant as applicable. Use exposed acoustic sealant at joints exposed to view on finished side.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
 - 1. Space fasteners in accordance with ASTM C840 and manufacturer's recommendations, unless fastener spacing is otherwise specified on structural Drawings for structural load-bearing walls.
 - 2. Install interior wall and partition boards horizontally, except where fire or sound rating requires a particular direction; comply with the method stated in the tested assembly data.
 - 3. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 24 inches in alternate courses of board.
- B. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- C. Single-Layer Non-Rated Applications: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
 - 2. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 3. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 4. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 5. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- D. Double-Layer Non-Rated Applications: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Place second layer perpendicular to framing or furring members. Offset joints of second and third layer from joints of first layer.
 - 1. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
- E. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
 - 1. Limit annular space between gypsum wall board edges and electrical device boxes to maximum 1/8 inch, or as limited by applicable Code.
- F. Exterior Sheathing Board Applications: Comply with ASTM C1280. Install sheathing horizontally, with edges butted tight and ends occurring over firm bearing.
 - 1. Seal joints, cut edges, and holes with water-resistant sealant.
 - 2. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
- G. Cementitious Backing Board Applications: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
 - 1. Use cementitious tile backer board for wall surfaces in shower and tub areas, high water or humidity exposure areas, and other locations indicated for use behind thin-set tile.

2. Install board with long edge perpendicular or parallel to framing. Hold bottom edge 1/4 inch above floor or fixture lip.
 3. Maintain manufacturer's required space between board edges.
- H. Installation on Metal Framing: Use screws for attachment of all gypsum board, except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.
- I. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4 inch to 3/8 inch wide joints to install sealant.
- J. Isolate perimeter of non-load-bearing wallboard partitions on slabs on grade at intersection with exterior walls and fixed structural abutments. Provide 1/4 inch space to allow differential vertical movement and trim edges with L-type edge trim. Seal joints with acoustical sealant.
1. At window sill locations, extend gypsum board joint vertically and in alignment with joint below, to full height of partition.
- K. Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum board with floating internal corner construction, unless isolation of the intersecting boards is indicated, or unless control or expansion joints are indicated.
- L. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- M. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
- N. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

3.05 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated and locations indicated to receive tile. Install with 1/4 inch gap where panels abut other construction or penetrations.
1. Apply level 5 finishes at locations where board extends beyond tile.
- B. Mold-Resistant Backing Board: Install where indicated with 1/4 inch gap where panels abut other construction or penetrations.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Place control joints consistent with lines of building spaces as indicated on Drawings; if not specifically indicated, provide control joints as follows:
1. Spacing: In accordance with GA 234.
 2. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 3. At exterior soffits, not more than 30 feet apart in both directions.

4. Do not bridge building control and expansion joints with gypsum board.. Utilize details shown in referenced standard.
 5. Terminate gypsum board on each side of joints.
 6. Extend control joints from both corners of door frames to top of wall where doors occur in long runs of wall.
 7. Comply with manufacturer requirements for constructing control and expansion joints in fire-rated assemblies.
 - a. Locate studs on both sides of joints. Attach two layers of gypsum board strips to back of one stud to fill area behind joint; provide continuous fire barrier behind joint without restricting movement.
 8. Locate in ceilings with area exceeding 900 square feet, where framing or furring changes direction, and spaced apart not more than 30 feet.
 9. Locate in ceilings where wings of "L", "U", and "T" shaped areas are joined.
 10. Provide mineral fiber acoustical insulation or gypsum panel backing at control joints in fire-rated assemblies to maintain fire rating.
- C. Corner Beads: Install at external corners, using longest practical lengths.
1. Attach with screws.
- D. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- E. Fasteners:
1. Attachment Methods:
 - a. Attach board to framing and furring with screws.
 - b. Attach board to board with screws.
 2. Except where indicated otherwise or where required for fire rated assemblies, space fasteners in compliance with more restrictive requirements of referenced installation standards or manufacturer's requirements.
 3. Attach board to supplementary framing and blocking which provide additional support at openings and cutouts

3.07 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 4:
 - a. Walls and ceilings to receive paint finish or wall coverings other than accent walls, unless otherwise indicated to receive Level 5.
 - b. Walls to receive wall coverings unless otherwise indicated to receive Level 5.
 - c. Embed joints and interior angles in joint compound. Apply 3 coats joint compound over joints, angles, fastener heads, and accessories.
 - d. Joint Compound: Smooth and free of tool marks and ridges.
 - e. Surface to be coated texture as indicated.
 2. Level 3:
 - a. Areas to receive glass-fiber faced tile backing gypsum board used as a tile substrate.
 - b. Use at locations such as storage, service rooms, riser closets, electrical rooms, and equipment rooms.
 - c. Embed joints and interior angles in joint compound. Apply 2 coats joint compound over joints, angles, fastener heads, and accessories.
 - d. Joint Compound: Smooth and free of tool marks and ridges.
 - e. Surface to be coated texture as indicated.
 3. Level 2:
 - a. Where water resistant gypsum board is specified for tile backing
 - b. Fire-rated, sound-rated, and smoke-rated assemblies in ceiling plenums and concealed areas.
 - c. Use at concealed areas and construction not indicated to be Levels 3, 4, or 5.

- d. Embed joints and interior angles in joint compound. Apply one coat joint compound over joints, angles, fastener heads, and accessories.
 - e. Surface: Free of excess joint compound.
- 4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
 - a. Embed joints and interior angles in joint compound. Apply 2 coats joint compound over joints, angles, fastener heads, and accessories.
 - b. Surface: Free of excess joint compound.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.
- D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.08 ADJUSTING

- A. Adjust and align metal framing to properly receive final finishes in accordance with required tolerances.
- B. Correct damages, defects, and leave work ready for decoration. Clean compounds from trim. Visible cracks, nail heads, tool marks, waves, distortions, or other similar defects shall not appear in finished work.

3.09 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.
- B. Promptly remove joint compound from surfaces not intended to receive compound.

3.10 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.11 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system as shown on the drawings.

1.02 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2017.
- B. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2017.
- C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- D. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2017.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Samples: Submit samples 4 by 4 inch in size illustrating material and finish of acoustical units.
- D. Samples: Submit two samples each, 12 inches long, of suspension system main runner.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.05 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.07 FIELD CONDITIONS

- A. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

- B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Acoustic Tiles/Panel Manufacturer:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. Other Acceptable Manufacturers:
 - a. Acoustic Ceiling Products, Inc: www.acpideas.com.
 - b. CertainTeed Corporation: www.certainteed.com.
 - c. Hunter Douglas Architectural: www.hunterdouglasarchitectural.com.
 - d. USG: www.usg.com.
- B. Suspension Systems:
 - 1. Same as for acoustical units.

2.02 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.
 - 4. Products:
 - a. USG Corporation: System DXL-H.

2.03 ACCESSORIES

- A. Fasteners for Face Fastening: Sharp point screw, all in one self-stop fastener.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B 633, Class SC 1 (mild) service condition.
 - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- C. Support Channels and Hangers: Galvanized steel; size for five times design load indicated in ASTM C635, Table 1, direct hung; type to suit application, to rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of L/360.
 - 1. Clips for Attachemet to Concrete over Steel Deck
 - a. Clip: Steel angle, ASTM A653M grade SS275, with a minimum Z180 coating; or DIN EN 10346 S320GD with Z200-N-A-C coating, 3/4 inch long by 1-1/8 inch by 0.0728 inch thick. The 1-1/8 inch leg has 0.22 inch diameter hole for powder-actuated fastener, 1/32 inch leg with 0.43 inch diameter hole for ceiling wire attachment.
 - 1) Product:
 - (a) Hilti Inc.; X-CC-27.

(1) Approval: ICC - ESR 2184.

- D. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 12 gage, 0.106 inch diameter wire.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- G. Perimeter Moldings: Same material and finish as grid.
 - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- H. Inside Corner: Prefabricated corner cap; formed to 90 degree angle; hemmed edge; size and finish to match wall molding.
- I. Outside Corner: Prefabricated corner cap; formed to 90 degree angle; hemmed edge; size and finish to match wall molding.
- J. Shadow Wall Molding: Formed steel section; exposed surfaces to match suspension system components.
- K. Acoustical Insulation: As specified in Section 09 8100.
- L. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Verify existing conditions before starting work.
- C. Verify that layout of hangers will not interfere with other work.
- D. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION - GENERAL

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580.
- C. CISCA Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies."

3.04 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
- J. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
- K. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- L. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
 - 1. Support all fixtures weighing greater than 56 lb by at least two supplementary No. 12 gage, 0.109 inch hangers if required by applicable building code; hangers may be slack.
- M. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- N. Do not eccentrically load system or induce rotation of runners.
- O. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- P. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap and rivet corners.
- Q. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

3.05 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Compliance of seismic design.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
 - 1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
 - a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
 - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.06 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 8100
ACOUSTIC INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustical batt insulation.

1.02 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM method below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristic: ASTM E 84.
 - 2. Fire Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.
- B. Single-Source Responsibility for Acoustical Insulation Products: Obtain each type of acoustical insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- B. Informational Submittals:
 - 1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - 2. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
 - 3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 01 8114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

PART 2 PRODUCTS

2.01 GENERAL

- A. General: Comply with regionally-sourced, recycled content, urea-formaldehyde prohibition, adhesives and sealants, aerosol adhesives, and volatile organic compound (VOC) product requirements specified in Section 01 8114 - Sustainable Design Requirements - CAL-Green.
 - 1. 25% postconsumer or 50% pre-consumer recycled content.
- B. Acoustic Insulation - General: Use type of acoustical insulation to comply with indicated assembly requirements.
 - 1. Where any specified rated assembly requires the use of proprietary acoustical insulation products, installation methods or procedures, comply with specified rated assembly requirements including requirements associated with assembly options which may be selected by Contractor.

2.02 BATT INSULATION

- A. Fiberglass Acoustic Insulation: ASTM C 665, Type I, unfaced, non-combustible as per ASTM E 136.
 - 1. Inorganic glass fiber material with a minimum density of 0.60 pounds per cubic foot.

2. Surface Burning Characteristics as per ASTM E 84: Flame Spread of 10; Smoke Developed of 10.
 3. Density: Minimum 2.0 pounds per cubic foot where used in rated floor/ceiling assembly and specified wall assemblies.
 4. Thickness: Full thickness of indicated wall framing, and 3-1/2 inches thick to comply with specified floor/ceiling assembly rating requirements.
 5. Widths: Match stud spacing and be self supporting between the studs.
 - a. For application above ceilings, select batt widths to be supported on ceiling construction over the entire ceiling area.
 6. Do not provide paper or other combustible backing or facing on batts.
 7. Select batt thickness to fill cavity airspace.
 8. Acceptable Products:
 - a. CertainTeed Corporation; CertaPro AcoustaTherm Batt.
 - b. Johns Manville; Sound-Shield Sound Control Batt.
 - c. Owens-Corning; Sound Attenuation Fire Batt Insulation/MW.
 - d. Prior approved equal.
- B. Mineral FiberAcoustic Insulation: ASTM C612; semi-rigid mineral fiber, unfaced; flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Thickness: Full thickness of indicated wall framing, and 3-1/2 inches thick to comply with specified floor/ceiling assembly rating requirements.
 2. Density: Minimum 2.0 pounds per cubic foot where used in rated floor/ceiling assembly and specified wall assemblies.
 3. Acceptable Products:
 - a. Thermafiber, Inc.; UltrBatt: www.thermafiber.com.
 - b. Roxul, Inc.; ROXUL AFB: www.roxul.com.
 - c. Prior approved equal.
- C. Color: Provide black acoustical insulation at Sacred Space.

2.03 ACOUSTICAL RIGID FIBER GLASS BOARD

- A. General: Inorganic glass fibers with a thermosetting resin binder complying with ASTM C 553/ASTM C 612, Type 1, faced with matte black mat on one side.
1. Surface Burning Characteristics as per ASTM E 84:
 2. Density: 3.0 pcf.
 3. Thickness: 2 inches.
- B. Basis of Design Product:
1. Owens-Corning SelectSound Black Acoustic Board.
 2. CertainTeed ToughGard Rigid Liner Board, Black.
 3. Johns Manville Black Faced Insul-SHIELD Board.

2.04 ACOUSTICAL DUCT WRAP FOR BREAKOUT NOISE CONTROL

- A. Acoustic Duct/Pipe/Conduit Wrap:
1. Basis of Design Product:
 - a. Sound Seal model B-20 LAG/QFA sound proofing pipe and duct wrap.
 - b. Kinetics Noise Control model KNM-200ALQ/KFA
 - c. Equal products of other manufacturers when approved in advance by the Architect.
 - d. Thickness: 1 inch.

2.05 ACCESSORIES

- A. Acoustic Sealant: As specified in Section 079219 - Acoustical Joint Sealants.
- B. Provide other materials, not specifically described but required for a complete and proper installation, as recommended by the Manufacturer, and subject to the approval of the Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.03 INSTALLATION

- A. Install accordance with manufacturer's recommendations, eliminating gaps, butting joints, tying or attaching fiberglass in place where it is not self supporting.
- B. Extend insulation full thickness to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- C. At Penetrations:
 - 1. Seal penetration of acoustical partitions by ductwork, cable, conduit or pipes. Cover gaps larger than 1/2 inch with gypsum board, lapped 2 inches minimum, and screwed before using acoustical sealant. Seal gaps in accordance with Section 079219 - Acoustical Joint Sealants.
 - 2. Cable Trays: Provide conduit sleeves at slab to slab partitions penetrated by cable trays. Flexible duct, pipe and conduit connections should be incorporated between rooms where resiliently isolated floors, walls, or ceilings occur.

3.04 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 09 9113
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates: As required by Drawings
 - 1. Steel.
 - 2. Galvanized metal.
- B. Surface preparation and field painting of exposed items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
 - 2. Field finish coating of shop or factory primed and prefinished items. Refer to individual Sections for priming requirements.
 - 3. Finish coatings schedule.
 - 4. Preparation work and coatings specified in this Section are in addition to shop and factory applied finishes and surface treatment specified in other Sections.
 - 5. Paint all other items unless specifically indicated not to be painted.
 - 6. Color schedule.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

1.02 DEFINITIONS

- A. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.
- B. Exposed Surfaces: Surfaces of products, assemblies, and components visible from any angle after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.
- C. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or all of product or assembly.
- D. Inaccessible Spaces: Spaces not intended for human use.
 - 1. Standard terms used by the coatings industry are defined in ASTM D 16.
- E. Gloss Levels
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
 - 6. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
 - 7. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.
- F. System DFT: Dry film thickness of entire coating system unless otherwise noted.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).
- D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- E. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113; current edition.
- F. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.
- G. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; Fourth Edition.
- H. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- I. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).
- J. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).
- K. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- L. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: For each paint system indicated. Include block fillers and primers.
 - a. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - b. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
 - 2. Samples for Initial Selection: For each type of topcoat product.
 - 3. Submit Samples on rigid backing, 8 inches square.
 - a. Step coats on Samples to show each coat required for system.
 - b. Label each coat of each Sample.
 - c. Label each Sample for location and application area.
 - 4. Product List: For each product indicated, include the following:
 - a. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - b. VOC content.
- B. Informational Submittals:
 - 1. Certifications specified in Quality Assurance article.
 - 2. Qualification Data: Applicator's qualification data.
 - 3. Manufacturer's instructions.
- C. Maintenance Materials Submittals
 - 1. Furnish two gallons of each type of paint used on the project.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 01 8114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.06 QUALITY ASSURANCE

- A. Field Samples: Apply field samples 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. Architect 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 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on field samples.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of field samples does not constitute approval of deviations from the Contract Documents contained in field samples unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 MOCK-UPS

- A. Mock-ups: Apply mock-ups 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. Architect 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 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mock-ups.
 - a. If preliminary color selections are not approved, apply additional mock-ups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically approves such deviations in writing.
- B. Subject to compliance with requirements, approved mock-ups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Add other requirements to suit Project.
 - 2. Product name or title of material.
 - 3. Product description (generic classification or binder type).
 - 4. Manufacturer's stock number and date of manufacture.
 - 5. Contents by volume, for pigment and vehicle constituents.
 - 6. Thinning instructions.
 - 7. Application instructions.
 - 8. Color name and number.
 - 9. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.09 FIELD CONDITIONS

- A. Environmental Conditions: Comply with more restrictive of following or manufacturer's requirements under which systems can be applied.

1. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
2. Apply water reducible coatings only when ambient and surface temperatures are between 50 deg F and 90 deg F.
3. Apply solvent reducible coatings only when ambient and surface temperatures are between 45 deg F and 90 deg F.
4. Do not apply coatings under any of following conditions:
 - a. When surfaces are damp or wet.
 - b. During rain, fog, or mist.
 - c. When relative humidity is less than 20 percent or exceeds 85 percent.
 - d. When temperature is less than 5 deg F above dew point.
 - e. When dust may be generated before coatings have dried.
 - f. In direct sunlight.
 - g. When wind velocity is above 20 mph.
5. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

1.10 WARRANTY

- A. Warrant installation to be free from defects in material and workmanship for 5 years.
- B. Repair or replace defects occurring during warranty period.
 1. Defects include but are not limited to pinholes, crazing or cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Benjamin Moore & Co .
 2. Kelly-Moore Paint Company Inc.
 3. PPG Paints.
 4. Sherwin-Williams Company (The).
 5. Tnemec.

2.02 PAINT, GENERAL

- A. 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.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Coatings:
 1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
 2. Use manufacturer's appropriate base materials to achieve required colors.
 3. Fully grind pigments to maintain soft paste consistency in vehicle.
 4. Capable of being dispersed into uniform, homogeneous mixture.
 5. Possess good flowing and brushing properties.
 6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
- D. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal

Standards GS-11 - Paints in the building, and CAL-Green Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.

1. CAL-Green Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
 - b. Flats: 50 grams per liter of product minus water
 - c. Non-flats: 100 grams per liter of product minus water
 - d. Non-flat High Gloss: 150 grams per liter of product minus water
 - e. Dry-Fog Coatings: 150 g/L.
 - f. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - g. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - h. Floor Coatings: 100 g/L.
 - i. Shellacs, Clear: 730 g/L.
 - j. Shellacs, Pigmented: 550 g/L.
- E. Colors: As selected by Architect from manufacturer's full range.
 1. 30 percent of surface area will be painted with deep tones.

2.03 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: Factory-formulated interior and exterior concrete block filler PDCA Level 2.
 1. Benjamin Moore and Company: Super Spec Masonry Int/Ext HI-Build Block Filler 206. Applied at a dry film thickness of not less than 8.5 mil.
 2. PPG Industries Speedhide Hi Fill Interior Exterior Latex Block Filler 6-15XI.
 3. Sherwin-Williams: Prep-Rite Block Filler B25W25.
 4. Tnemec; Series 130 Envirofill

2.04 PRIMERS/SEALERS

- A. Exterior Concrete and Masonry Primer: Factory-formulated alkali-resistant acrylic-latex primer for exterior application.
 1. Benjamin Moore and Company: Fresh Start All Purpose 100% Acrylic Primer #023. Applied at a dry film thickness of not less than 1.2 mil.
 2. Kelly-Moore; 247 Chem-Guard Acrylic Masonry Primer: Applied at a dry film thickness of not less than 1.9 mils.
 3. PPG Paints; Perma-Crete Alkali Resistant Primer 4-603XI. Applied at a dry film thickness not less than 1.3 mils.
 4. Sherwin-Williams; Loxon Concrete & Masonry Primer A24W08300: Applied at a dry film thickness of not less than 3.0 mils.
 5. Tnemec; Series 180 W.B. Tneme-Crete. Applied at a dry film thickness rate of not less than 4.0 mils.
- B. Exterior Gypsum Soffit Board Primer: Factory-formulated alkyd- or alkali-resistant acrylic-latex primer for exterior application.
 1. Benjamin Moore and Company: Fresh Start All Purpose Alkyd Primer #204. Applied at a dry film thickness of not less than 1.8 mil.
 2. Kelly-Moore; 250 Color Shield Exterior Acrylic Primer: Applied at a dry film thickness of not less than 1.7 mils.
 3. PPG Paints; Seal Grip Acrylic Universal Primer 17-921XI. Applied at a dry film thickness of not less than 1.6 mils.
 4. Sherwin-Williams; : Exterior Latex Wood Primer, B42W8041Applied at a dry film thickness of not less than 1.4 mils.
 5. Tnemec; Series 180 W.B. Tneme-Crete. Applied at a dry film thickness rate of not less than 4.0 mils.
- C. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.
 1. DeVoe (International): Devflex 4020 DTM Flat Interior / Exterior Waterborne Primer .

2. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mil.
 3. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust Inhibitive Primer: Applied at a dry film thickness of not less than 2.0 mils.
 4. PPG Paints; Speedhide Alkyd Metal Primer 6-208. Applied at a dry film thickness of not less than 2.3 mils or Water Based option; Pitt Tech Plus DTM Acrylic Primer 4020 Applied at a dry film thickness of not less than 2.0 mils.
 5. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils If a waterbased primer is desired, use S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 6. Tnemec; Series 115 Uni-Bond DF. Applied at a dry film thickness rate of not less than 3.0 mils DFT.
- D. Exterior Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.
1. DeVoe (International): Devflex 4020 DTM Flat Interior / Exterior Waterborne Primer .
 2. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mil.
 3. Kelly-Moore; 1722 Kel-Guard Acrylic Galvanized Iron Primer: Applied at a dry film thickness of not less than 1.8 mils.
 4. Kelly-Moore; 5725 DTM-Acrylic Metal Primer: Applied at a dry film thickness of not less than 1.8 mils.
 5. PPG Paints; Pitt Tech Plus DTM Acrylic Primer 4020 Applied at a dry film thickness of not less than 2.0 mils.
 6. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 7. Tnemec:
 - a. Under Acrylics: Series 115 Uni-Bond DF; Applied at a dry film thickness rate of not less than 3.0 mils.
 - b. Under Urethane: Series L69 H.B. Epoxoline II; Applied at a dry film thickness rate of not less than 3.0 mils.
- E. Exterior Aluminum Primer under Acrylic Finishes: Factory-formulated acrylic-based metal primer for exterior application.
1. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mil.
 2. Kelly-Moore; 1722 Kel-Guard Acrylic Galvanized Iron Primer: Applied at a dry film thickness of not less than 1.8 mils.
 3. Kelly-Moore; 5725 DTM-Acrylic Metal Primer: Applied at a dry film thickness of not less than 1.8 mils.
 4. PPG Paints; Pitt Tech Plus DTM Acrylic Primer 4020 Applied at a dry film thickness of not less than 2.0 mils.
 5. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 6. Tnemec; Series 115 Uni-Bond DF; Applied at a dry film thickness rate of not less that 3.0 mils.
- F. Exterior Aluminum Primer under Alkyd Finishes: Factory-formulated acrylic-based metal primer for exterior application.
1. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mil.
 2. Kelly-Moore; 1722 Kel-Guard Acrylic Galvanized Iron Primer: Applied at a dry film thickness of not less than 1.8 mils.
 3. PPG Paints; Pitt Tech Plus DTM Acrylic Primer 4020 Applied at a dry film thickness of not less than 2.0 mils

4. Sherwin-Williams S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310 Applied at a dry film thickness of not less than XXX mils .Applied at a dry film thickness of not less than 3.0 mils.
5. Tnemec; Series 115 Uni-Bond DF; Applied at a dry film thickness rate of not less than 3.0 mils.

2.05 WATER-BASED PAINTS

- A. Exterior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for exterior application.
 1. Benjamin Moore and Company: Ultra Spec EXT Flat Finish N447. Applied at a dry film thickness of not less than 1.5 mil.
 2. Kelly-Moore; 1205 Color Shield Exterior Flat Acrylic House Paint: Applied at a dry film thickness of not less than 1.9 mils.
 3. PPG Paints; Speedhide Exterior 100% Acrylic Flat Latex 6-610XI Series. Applied at a dry film thickness of not less than 1.5 mils
 4. Sherwin-Williams; A-100 Exterior Latex Flat A6 Series: Applied at a dry film thickness of not less than 1.3 mils.
 5. Tnemec; Series 180 W.B. Theme-Crete; Applied at a dry film thickness rate of not less than 4.0 mils.
- B. Exterior Low-Luster Acrylic Paint: Factory-formulated low-sheen (eggshell) acrylic-latex paint for exterior application.
 1. Benjamin Moore and Company: Ultra Spec EXT Satin Finish N448. Applied at a dry film thickness of not less than 1.5 mil.
 2. Kelly-Moore; 1245 Acry-Velvet Exterior Low Sheen Acrylic Finish: Applied at a dry film thickness of not less than 1.8 mils.
 3. PPG Paints; Speedhide Exterior 100% Acrylic Satin Latex 6-2045XI Series. Applied at a dry film thickness of not less than 1.5 mils.
 4. Sherwin-Williams; A-100 Exterior Latex Satin A82 Series: Applied at a dry film thickness of not less than 1.5 mils.
 5. Tnemec; Series 1029 Enduratone; Applied at a dry film thickness rate of not less than 2.0 mils.
- C. Exterior Semigloss Acrylic Enamel for Steel Applications: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.
 1. PPG Paints: Pitt Tech Plus : Devflex 4216 High Performance Waterborne acrylic Semigloss Enamel Coverage Applied at a dry film thickness of not less than 2.5 mils.
- D. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.
 1. Benjamin Moore and Company: Ultra Spec EXT Gloss Finish N449. Applied at a dry film thickness of not less than 1.5 mil.
 2. Kelly-Moore; 1250 Acry-Lustre Exterior Semi-Gloss Acrylic Finish: Applied at a dry film thickness of not less than 1.6 mils.
 3. PPG Paints; Speedhide Exterior 100% Acrylic Semi-Gloss Latex 6-900XI Series. Applied at a dry film thickness of not less than 1.5 mils.
 4. Sherwin-Williams; A-100 Latex Gloss A8 Series: Applied at a dry film thickness of not less than 1.3 mils.
 5. Tnemec; Series 1029 Enduratone; Applied at a dry film thickness rate of not less than 2.0 mils.
- E. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals: Factory-formulated full-gloss waterborne acrylic-latex enamel for exterior application.
 1. Benjamin Moore and Company: Ultra Spec EXT Gloss Finish N449. Applied at a dry film thickness of not less than 1.5 mil.
 2. Kelly-Moore; 5780 DTM Acrylic Gloss Enamel: Applied at a dry film thickness of not less than 1.7 mils.

3. PPG Paints; Pitt Tech DTM Acrylic Gloss 90-374 Series. Applied at a dry film thickness of not less than 2.0 mils.
 4. Sherwin-Williams; S-W Pro Industrial Acrylic Gloss, B66-600 Series. Applied at a dry film thickness of not less than 2.1 mils.
 5. Tnemec; Series 1028 Enduratone; Applied at a dry film thickness rate of not less than 2.0.
- F. Elastomeric Coatings for Concrete Masonry Units:
1. Glidden Professional: Decra-Flex 300 Elastomeric Coating System 2260 Smooth, Applied at a dry film thickness of not less than 6 mils.

2.06 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, 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 paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- C. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Portland Cement Plaster: 12 percent.
 5. Gypsum Board: 12 percent.
 6. Cement Plaster Substrates: Verify that plaster is fully cured.
 7. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint 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.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
- D. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- E. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- F. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- G. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- H. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- J. Aluminum Substrates: Remove loose surface oxidation.
- K. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- L. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.03 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
- B. Use applicators and techniques suited for paint and substrate indicated.
- C. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- D. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
- E. Paint entire exposed surface of window frames and sashes.
- F. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

- G. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- H. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- I. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- J. 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.
- K. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
- L. Paint the following work where exposed to view:
- M. Equipment, including panelboards .
- N. Uninsulated metal piping.
- O. Uninsulated plastic piping.
- P. Pipe hangers and supports.
- Q. Metal conduit.
- R. Plastic conduit.
- S. Tanks that do not have factory-applied final finishes.

3.04 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.05 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.06 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. 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 Architect, and leave in an undamaged condition.
- D. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.07 EXTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, sheen as indicated on Finish Schedule.
- B. CMU Substrates:
 - 1. Latex System:
 - a. Prime Coat: Block filler, latex, interior/exterior.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, sheen as indicated on Finish Schedule.
- C. Steel Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Shop primer specified in Section where substrate is specified.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, exterior, sheen as indicated on Finish Schedule.
- D. Galvanized-Metal Substrates:
 - 1. Latex System:
 - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, sheen as indicated on Finish Schedule.
- E. Aluminum Substrates:
 - 1. Latex System:
 - a. Prime Coat: Primer, quick dry, for aluminum.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior gloss - sheen as indicated on Finish Schedule.
- F. Exterior Gypsum Board Substrates:
 - 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - 2. Topcoat: Latex, exterior, sheen as indicated on Finish Schedule.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Steel.
 - 2. Galvanized metal.
 - 3. Gypsum board.
- B. Surface preparation and field painting of exposed items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
 - 2. Field finish coating of shop or factory primed and prefinished items. Refer to individual Sections for priming requirements.
 - 3. Finish coatings schedule.
 - 4. Preparation work and coatings specified in this Section are in addition to shop and factory applied finishes and surface treatment specified in other Sections.
 - 5. Paint all other items unless specifically indicated not to be painted.
 - 6. Color schedule.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

1.02 DEFINITIONS

- A. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.
- B. Exposed Surfaces: Surfaces of products, assemblies, and components visible from any angle after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.
- C. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or all of product or assembly.
- D. Inaccessible Spaces: Spaces not intended for human use.
 - 1. Standard terms used by the coatings industry are defined in ASTM D 16.
- E. Gloss Levels
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
 - 6. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
 - 7. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.
- F. System DFT: Dry film thickness of entire coating system unless otherwise noted.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2005 (Reapproved 2012).
- D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- E. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.
- F. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; Fourth Edition.
- G. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- H. SSPC-SP 2 - Hand Tool Cleaning; 1982, with Editorial Revision (2004).
- I. SSPC-SP 3 - Power Tool Cleaning; 1982, with Editorial Revision (2004).
- J. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- K. SSPC-SP 13 - Surface Preparation of Concrete; 1997 (Reaffirmed 2003).

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: For each paint system indicated. Include block fillers and primers.
 - a. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - b. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
 - 2. Samples for Initial Selection: For each type of topcoat product.
 - 3. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - a. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - b. Step coats on Samples to show each coat required for system.
 - c. Label each coat of each Sample.
 - d. Label each Sample for location and application area.
 - 4. Product List: For each product indicated, include the following:
 - a. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - b. VOC content.
- B. Informational Submittals:
 - 1. Certifications specified in Quality Assurance article.
 - 2. Qualification Data: Applicator's qualification data.
 - 3. Manufacturer's instructions.
- C. Maintenance Materials Submittals:
 - 1. Furnish two gallons of each type of paint used on the project.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 01 8114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.06 MOCK-UPS

- A. Mock-ups: Apply mock-ups 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. Architect 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 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mock-ups.
 - a. If preliminary color selections are not approved, apply additional mock-ups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mock-ups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Add other requirements to suit Project.
 - 2. Product name or title of material.
 - 3. Product description (generic classification or binder type).
 - 4. Manufacturer's stock number and date of manufacture.
 - 5. Contents by volume, for pigment and vehicle constituents.
 - 6. Thinning instructions.
 - 7. Application instructions.
 - 8. Color name and number.
 - 9. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.08 FIELD CONDITIONS

- A. Environmental Conditions: Comply with more restrictive of following or manufacturer's requirements under which systems can be applied.
 - 1. Provide continuous ventilation during application of coatings to exhaust hazardous fumes.
 - 2. Provide heating necessary to maintain surface and ambient temperatures within specified limits.
 - 3. Maintain temperature and humidity conditions for minimum 24 hours before, during, and 48 hours after application of finishes, unless longer times are required by manufacturer.
 - 4. Do not permit wide variations in ambient temperatures which might result in condensation on freshly coated surfaces.
 - 5. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
 - 6. Apply water reducible coatings only when ambient and surface temperatures are between 50 degrees F and 90 degrees F.
 - 7. Apply solvent reducible coatings only when ambient and surface temperatures are between 45 degrees F and 90 degrees F.
 - 8. Do not apply coatings under any of following conditions:
 - a. When surfaces are damp or wet.
 - b. During snow, rain, fog, or mist.
 - c. When relative humidity is less than 20 percent or exceeds 85 percent.

- d. When temperature is less than 5 degrees F above dew point.
- e. When dust may be generated before coatings have dried.
- f. In direct sunlight.
- g. When wind velocity is above 20 mph.
- 9. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

1.09 WARRANTY

- A. Warrant installation to be free from defects in material and workmanship for 5 years.
- B. Repair or replace defects occurring during warranty period.
 - 1. Defects include but are not limited to pinholes, crazing or cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Benjamin Moore & Co.
 - 2. Kelly-Moore Paint Company Inc.
 - 3. PPG Paints.
 - 4. Sherwin-Williams Company (The).

2.02 PAINT, GENERAL

- A. 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.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Coatings:
 - 1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
 - 2. Use manufacturer's appropriate base materials to achieve required colors.
 - 3. Fully grind pigments to maintain soft paste consistency in vehicle.
 - 4. Capable of being dispersed into uniform, homogeneous mixture.
 - 5. Possess good flowing and brushing properties.
 - 6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
 - 7. VOC content of field applied coatings shall comply with local governing authorities.
- D. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building, and CAL-Green Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 - 1. CAL-Green requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
 - b. Flats: 50 grams per liter of product minus water
 - c. Non-flats: 100 grams per liter of product minus water
 - d. Non-flat High Gloss: 150 grams per liter of product minus water
 - e. Dry-Fog Coatings: 150 g/L.
 - f. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - g. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - h. Floor Coatings: 100 g/L.

- i. Shellacs, Clear: 730 g/L.
 - j. Shellacs, Pigmented: 550 g/L.
- E. Colors: As indicated on Materials & Specifications Legend.

2.03 BLOCK FILLERS

- A. Interior Concrete Block Filler: Factory-formulated interior and exterior concrete block filler. PDCA Level 2.
- 1. Benjamin Moore and Company: Super Spec Masonry Int/Ext HI-Build Block Filler 206. Applied at a dry film thickness of not less than 8.5 mil.
 - 2. PPG Industries; Speedhide Interior Exterior Latex Block Filler 6-7
 - 3. Sherwin-Williams: Prep-Rite Block Filler B25W25.

2.04 PRIMERS/SEALERS

- A. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.
- 1. Benjamin Moore and Company: Ultra Spec 500 Interior Latex Primer #N534. Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Kelly-Moore; 971 Acry-Prime Interior Latex Primer/Sealer: Applied at a dry film thickness of not less than 1.6 mils.
 - 3. PPG Paints; Speedhide zero Interior Latex Primer/Sealer 6-4900XI. Applied at a dry film thickness of not less than 1.4 mils
 - 4. Sherwin-Williams; S-W ProMar 200 Zero VOC Primer, B28W02600. Applied at a dry film thickness of not less than 1.0 mil.
 - 5. Sherwin-Williams; S-W Pro Industrial WB Acrylic Dryfall. Applied at a dry film thickness of not less than 1.0 mil.
- B. Interior Wood Primer for Acrylic-Enamel and Semigloss Alkyd-Enamel Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.
- 1. Benjamin Moore and Company: Ultra Spec 500 Interior Latex Primer #N534. Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Kelly-Moore; 975 Acry Plex Interior Latex Enamel Undercoat: Applied at a dry film thickness of not less than 1.6 mils.
 - 3. PPG Paints; Seal Grip Interior Primer/Finis 17-951. Applied at a dry film thickness of not less than 1.2 mils
 - 4. Sherwin-Williams; Premium Wall and Wood Primer B28W08111 Series: Applied at a dry film thickness of not less than 1.6 mils.
 - 5. Sherwin-Williams; S-W PrepRite ProBlock® Latex Primer/Sealer B51 Series. Applied at a dry film thickness of not less than 1.4 mil.
 - 6. Sherwin-Williams; ProMar 200 Zero VOC Primer, B28W2600, 0 g/L VOC, MPI-149. Applied at a dry film thickness of not less than 1.0 mil.
- C. Interior Wood Primer for Full-Gloss Alkyd-Enamel Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.
- 1. Benjamin Moore and Company: Ultra Spec 500 Interior Latex Primer #N534 Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Kelly-Moore; 985 Flo-Cote Alkyd Enamel Undercoater: Applied at a dry film thickness of not less than 2.5 mils.
 - 3. PPG Paints; Seal Grip Interior Primer/Finis 17-951. Applied at a dry film thickness of not less than 1.2 mils.
 - 4. Sherwin-Williams; S-W PrepRite ProBlock® Latex Primer/Sealer B51 Series. Applied at a dry film thickness of not less than 1.4 mil.
- D. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
- 1. Benjamin Moore and Company: Super Spec HP Alkyd Metal Primer #P06. Applied at a dry film thickness of not less than 1.7 mil.
 - 2. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust Inhibitive Primer: Applied at a dry film thickness of not less than 2.0 mils.

3. PPG Paints; Pitt Tech Plus DTM Acrylic Primer 4020. Applied at a dry film thickness of not less than 2.0 mils.
 4. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 5. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
- E. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.
1. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mils.
 2. Kelly-Moore; 1722 Kel-Guard Acrylic Galvanized Iron Primer: Applied at a dry film thickness of not less than 1.8 mils.
 3. PPG Paints; Pitt Tech Plus DTM Acrylic Primer 4020. Applied at a dry film thickness of not less than 2.0 mils
 4. Sherwin-Williams: Pro-Cryl universal primer/finish, B66-310. Applied at a dry film thickness of not less than 3.0 mils.
 5. Sherwin-Williams; Pro Industrial Pro-Cryl Primer. Applied at a dry film thickness of not less than 1.0 mils
- F. Interior Ferrous-Metal Primer for High Performance Paint: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
1. Dunn-Edwards Corporation; ENPR00 Enduraprime Low VOC, Interior / Exterior, Red Oxide or White, Waterborne Alkyd Rust Preventative Metal Primer: Applied at a dry film thickness of not less than 2.0 mils.
 2. Kelly-Moore; 1711 Kel-Guard Alkyd White Rust Inhibitive Primer: Applied at a dry film thickness of not less than 2.0 mils.
 3. PPG Paints; Pitt Tech Plus DTM Acrylic Primer 4020. Applied at a dry film thickness of not less than 2.0 mils.
 4. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 5. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.

2.05 FINISH COATS

- A. High-Performance Architectural Latex System - Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
1. Benjamin Moore and Company: Ultra Spec 500 Interior Flat Finish N536. Applied at a dry film thickness of not less than 1.8 mil.
 2. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint: Applied at a dry film thickness of not less than 1.8 mils.
 3. PPG Paints; Speedhide zero Interior Latex Flat 6-4110XI. Applied at a dry film thickness of not less than 1.3 mils
 4. Sherwin-Williams; S-W ProMar 200 Zero VOC Flat, B30W02651. Applied at a dry film thickness of not less than 1.6 mil.
- B. High-Performance Architectural Latex System - Flat Acrylic Dryfall Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
1. Benjamin Moore and Company: Ultra Spec 500 Interior Flat Finish N536. Applied at a dry film thickness of not less than 1.8 mil.
 2. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint: Applied at a dry film thickness of not less than 1.8 mils.
 3. PPG Paints; Speedhide zero Interior Latex Flat 6-4110XI. Applied at a dry film thickness of not less than 1.3 mils
 4. Sherwin-Williams; S-W Pro Industrial Waterborne Acrylic Dryfall, B42W00181. Applied at a dry film thickness of not less than 2.0 mils.
- C. High-Performance Architectural Latex System - Flat Latex-Emulsion Size: Factory-formulated flat latex-based interior paint.

1. Benjamin Moore and Company: Ultra Spec 500 Interior Flat Finish N536. Applied at a dry film thickness of not less than 1.8 mil.
 2. Kelly-Moore; 450 Pro-Wall Interior Flat Latex Wall Paint: Applied at a dry film thickness of not less than 1.8 mils.
 3. PPG Industries; Speedhide zero Interior Latex Flat 6-4110XI. Applied at a dry film thickness of not less than 1.3 mils
 4. Sherwin-Williams; S-W ProMar 200 Zero VOC Flat, B30W02651. Applied at a dry film thickness of not less than 1.6 mil.
- D. High-Performance Architectural Latex System - Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.
1. Benjamin Moore and Company: Ultra Spec 500 Interior Eggshell Finish N538. Applied at a dry film thickness of not less than 1.8 mil.
 2. Kelly-Moore; 1610 Sat-N-Sheen Interior Latex Low Sheen Wall and Trim Finish: Applied at a dry film thickness of not less than 1.6 mils.
 3. PPG Paints; Speedhide zero Interior Latex Eggshell 6-4310XI. Applied at a dry film thickness of not less than 1.5 mils
 4. Sherwin-Williams; S-W ProMar 200 Zero VOC EgShel, B20W02651. Applied at a dry film thickness of not less than 1.6 mil.
- E. High-Performance Architectural Latex System - Semigloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.
1. Benjamin Moore and Company: Ultra Spec 500 Interior Semi-Gloss Finish N539. Applied at a dry film thickness of not less than 1.8 mil.
 2. Kelly-Moore; 1649 Acrylic-Latex Semi-Gloss Enamel: Applied at a dry film thickness of not less than 1.7 mils.
 3. PPG Paints; Speedhide zero Interior Latex Semi-Gloss 6-4510XI. Applied at a dry film thickness of not less than 1.3 mils
 4. Sherwin-Williams; ProMar 200 Zero VOC Sem-Gloss, B31W02651. Applied at a dry film thickness of not less than 1.7 mil.
- F. High-Performance Architectural Latex System - Full-Gloss Acrylic Enamel: Factory-formulated full-gloss acrylic-latex interior enamel.
1. Benjamin Moore and Company: Ultra Spec 500 Interior Gloss Finish N540. Applied at a dry film thickness of not less than 1.8 mil.
 2. Kelly-Moore; 1680 Dura-Poxy Gloss Acrylic Enamel: Applied at a dry film thickness of not less than 1.6 mils.
 3. PPG Paints; 6-8534 SpeedHide Interior Latex 100 Percent Acrylic Gloss Enamels: Applied at a dry film thickness of not less than 1.2 mil.
 4. Sherwin-Williams; Solo 100% Acrylic Interior/Exterior Gloss: Applied at a dry film thickness of not less than 1.5 mils.
- G. Interior Semigloss Alkyd Enamel: Factory-formulated semigloss alkyd enamel for interior application.
1. Benjamin Moore and Company: Advance Waterborne Interior Waterborne Interior Alkyd Satin Finish #792. Applied at a dry film thickness of not less than 1.35 mil.
 2. Kelly-Moore; 1630--Kel-Cote Interior Alkyd Semi-Gloss Enamel: Applied at a dry film thickness of not less than 2.2 mils.
 3. PPG Paints; Speedhide Interior Alkyd Semi-Gloss Enamel 6-1110XI. Applied at a dry film thickness of not less than 2.1 mils
 4. Sherwin-Williams; Pro Industrial Waterbased Alkyd Urethane Enamel, B53-1150 Series. Applied at a dry film thickness of not less than 1.4 mils.
 5. Sherwin-Williams; Pro Industrial Acrylic Semi-Gloss, B66-650 series, 0 g/L VOC, MPI 163. Applied at a dry film thickness of not less than 3.0 mils.
- H. Interior Full-Gloss Alkyd Enamel for Gypsum Board and Plaster: Factory-formulated full-gloss alkyd interior enamel.

1. Benjamin Moore and Company: Advance Waterborne Interior Waterborne Interior/Exterior Alkyd High Gloss Finish #794. Applied at a dry film thickness of not less than 1.5 mil.
 2. Kelly-Moore; 1700 Kel-Guard Gloss Alkyd Rust Inhibitive Enamel: Applied at a dry film thickness of not less than 2.0 mils.
 3. PPG Paints; Speedhide Alkyd Gloss Enamel 6-282 Series. Applied at a dry film thickness of not less than 2.3 mils
 4. Sherwin-Williams; Pro Industrial Waterbased Alkyd Urethane Enamel, B53-1050 Series. Applied at a dry film thickness of not less than 1.4 mils.
- I. Interior Full-Gloss Alkyd Enamel for Wood and Metal Surfaces: Factory-formulated full-gloss alkyd interior enamel.
1. Benjamin Moore and Company: Advance Waterborne Interior Waterborne Interior Alkyd Satin Finish #792. Applied at a dry film thickness of not less than 1.35 mil.
 2. Kelly-Moore; 1630--Kel-Cote Interior Alkyd Semi-Gloss Enamel: Applied at a dry film thickness of not less than 2.2 mils.
 3. PPG Paints; Speedhide Alkyd Gloss Enamel 6-282 Series. Applied at a dry film thickness of not less than 2.3 mils
 4. Sherwin-Williams; Pro Industrial Waterbased Alkyd Urethane Enamel, B53-1050 Series. Applied at a dry film thickness of not less than 1.4 mils.

2.06 GALVANIZED METAL PREPARATION

- A. Interior Concrete Block Filler: Factory-formulated interior and exterior concrete block filler. PDCA Level 2.
1. Benjamin Moore and Company: Super Spec Masonry Int/Ext HI-Build Block Filler 206. Applied at a dry film thickness of not less than 8.5 mil.
 2. PPG Industries; Speedhide Interior Exterior Latex Block Filler 6-7
 3. Sherwin-Williams: Prep-Rite Block Filler B25W25.

2.07 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, 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 paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- C. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
 5. Plaster: 12 percent.
- D. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Plaster Substrates: Verify that plaster is fully cured.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates 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 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.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods or chemical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Sand surfaces that will be exposed to view, and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.03 PIPE LABELING:

- A. Label piping after installation and painting.

- B. Pipe Labeling: Comply with requirements of current OSHA Standards (ANSI A13.1) and shall be achieved by the application of specified labels as manufactured by Brady, Seton or equal. Refer to Division 22 for labeling unless listed.
- C. Apply labels at mechanical equipment, adjacent to valves, and on 25 foot centers on long pipe runs in enclosed areas or 100 feet on center on long pipe runs in open areas.
- D. Insulated Pipe Labeling: None - See Division 22 for labeling unless listed.
- E. Uninsulated Pipe Labeling: None - See Division 22 for labeling unless listed.

3.04 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
 - 6. Paint Color Transitions: Provide sharp straight line transitions from colors with no bleed.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. 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.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.05 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.06 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. 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 Architect, and leave in an undamaged condition.
- D. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.07 INTERIOR PAINTING SCHEDULE

- A. Sheen: Sheen as indicated on Finish Schedule.
- B. Concrete Substrates, Nontraffic Surfaces:
 1. High-Performance Architectural Latex System: Two topcoats over a primer.
 - a. Prime Coat: Primer, alkali resistant, water based.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, sheen as indicated on Finish Schedule.
- C. CMU Substrates:
 1. High-Performance Architectural Latex System:
 - a. Block Filler: Block filler, latex, interior/exterior.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, sheen as indicated on Finish Schedule.
- D. Steel Substrates:
 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Shop primer specified in Section where substrate is specified.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, sheen as indicated on Finish Schedule.
 2. High-Performance Steel System for Hangar Areas:
 - a. Prime Coat: Shop primer specified in Section where substrate is specified.
 - b. Intermediate Coat: High performance acrylic architectural paint, matching topcoat.
 - c. Topcoat: High performance acrylic architectural paint, gloss (Gloss Level 6).
- E. Galvanized-Metal Substrates:
 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer, galvanized, water based.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, sheen as indicated on Finish Schedule.
- F. Wood Substrates: Including wood trim, architectural woodwork, doors, windows, and wood-based panel products

1. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer, latex, for interior wood.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, sheen as indicated on Finish Schedule.
- G. Gypsum Board Substrates:
 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer sealer, latex, interior.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, sheen as indicated on Finish Schedule.

END OF SECTION

SECTION 10 1400

SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. ADA or Code Required room and door signs.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- C. ASTM E2072 - Standard Specification for Photoluminescent (Phosphorescent) Safety Markings; 2014.
- D. UL 1994 - Luminous Egress Path Marking Systems; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by Owner through Architect prior to fabrication.
- C. Samples: Submit three samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- E. Verification Samples: Submit samples showing colors specified.
- F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Tactile Signs:
 - 1. Kroy Sign Systems LLC, 7575 E. Redfield Rd., Suite 113, Scottsdale, Arizona, 85260; Telephone (800) 950-5769; Fax (800) 916-3212; www.kroysignsystems.com
 - 2. Approved Equal

2.02 PHOTOPOLYMER TACTILE SIGNS

- A. General: Provide panel signs fabricated from photopolymer sign materials and processes for producing raised copy and Grade II Braille. Panel signs shall comply with the manufacturer's requirements indicated for materials, thickness, colors, designs, shapes, sizes and details of construction.

- B. Produce panel signs to comply with applicable provisions of the ADA Accessibility Guidelines and ICC/ANSI A117.1/98 Standards including, but not limited to, 0.031 inch raised tactile, graphics, text and Grade II Braille characters.
- C. Panel signs shall be constructed to remain flat under installed conditions and within a tolerance of plus or minus 0.015 inch when measured diagonally.
- D. Panels with chemically welded, adhesive mounted or glued graphics, text and Braille are unacceptable.
- E. Photopolymer Tactile Signs: Manufacturer's standard product and as follows:
 - 1. Provide raised graphics and tactile images fabricated from the manufacturer's list of applicable photopolymer sign materials. Specify photopolymer sign materials from the manufacturer's standard materials.
 - 2. Steel-backed based photopolymer faceplate material with an overall image thickness of 0.030 inch. Material will have a minimum durometer hardness rating of not less than 90 Shore D. Photopolymer will be permanently mounted to a 0.125 inch black acrylic backer. Copy and Grade II Braille as provided by the architect.
 - 3. Copy shall be left justified unless otherwise specified by the architect. Grade II Braille shall be positioned directly beneath text.
 - 4. Photopolymer panel signs shall be of consistent color with edges mechanically and smoothly finished to conform to manufacturer's standard requirements. Corner edge shall be square.
 - 5. Photopolymer panel sign size shall be 4 by 8 inches.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and in compliance with the manufacturer's written instructions.
- B. Install in accordance with manufacturer's instructions.
- C. Install neatly, with horizontal edges level.
- D. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- E. Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of the door.
- F. Attachment Method: Double-sided foam tape.
- G. Protect from damage until Substantial Completion; repair or replace damaged items.
- H. Install at locations indicated on drawings

END OF SECTION

SECTION 10 2113.13
METAL TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal toilet compartments.
- B. Urinal screens.

1.02 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and floor supports, door swings.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of reinforcements for compartment-mounted grab bars and locations of blocking for surface-mounted toilet accessories.
 - 4. Show locations of centerlines of toilet fixtures.
 - 5. Show locations of floor drains.
 - 6. Show ceiling grid, ceiling-mounted items, and overhead support or bracing locations.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Samples: Submit manufacturer's full range of available colors, for selection.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Metal Toilet Compartments:
 - 1. Metpar Corp; Type FP-500 Corinthian: www.metpar.com.
 - 2. Other Acceptable Manufacturer's:
 - a. All American Metal Corp - AAMCO: www.allamericanmetal.com.
 - b. General Partitions Mfg. Corp: www.generalpartitions.com.
 - c. Global Steel Products Corp: www.globalpartitions.com.

2.02 MATERIALS

- A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

2.03 COMPONENTS

- A. Toilet Compartments: Powder coated steel, floor-mounted overhead-braced.
- B. Doors, Panels, and Pilasters: Sheet steel faces, pressure bonded to sound deadening core, formed and closed edges; corners made with corner clips or mitered, welded, and ground smooth.
 - 1. Panel Faces: 20 gage, 0.0359 inch.
 - 2. Door Faces: 22 gage, 0.0299 inch.
 - 3. Pilaster Faces: 20 gage, 0.0359 inch.
 - 4. Reinforcement: 12 gage, 0.1046 inch.

5. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.
- C. Door and Panel Dimensions:
 1. Thickness: 1 inch.
 2. Door Width: As indicated on Drawings.
 3. Door Width for Handicapped Use: 36 inch, out-swinging.
 4. Height: 58 inch.
- D. Pilasters: 1-1/4 inch thick, of sizes required to suit compartment width and spacing.
- E. Urinal Screen Splash Panels: Stainless steel sheet 30 inch wide by 42 inch high mounted on partitions adjacent to urinals. Fasten with stainless steel screws spaced 8 inches on center.

2.04 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A666, Type 304 stainless steel with No. 4 finish, 3 inch high, concealing floor fastenings.
 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Hollow chrome-plated steel tube, 1 by 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- C. Brackets: Polished chrome-plated non-ferrous cast metal.
- D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- E. Hardware: Polished chrome plated non-ferrous cast metal:
 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 2. Thumb turn or sliding door latch with exterior emergency access feature.
 - a. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - b. Latch: Concealed bolt or surface mounted, equipped with accessible slide bolt, combination strike/keeper with rubber bumper, and emergency operation feature mounted at 30 inches to 44 inches above floor.
 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 4. Coat hook with rubber bumper; one per compartment, mounted on door.
 5. Provide door pull for outswinging doors.

2.05 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
- B. Floor-Anchored, Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Door Size and Swings: Unless otherwise indicated, provide 24 inch wide in-swinging doors for standard toilet compartments and 36 inch wide out-swinging doors with a minimum 32 inch wide clear opening for compartments designated as accessible.

2.06 FINISHING

- A. Powder Coated Steel Compartments: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat and two finish coats powder coat enamel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.

- B. Verify that field measurements are as indicated.
- C. Verify correct spacing of and between plumbing fixtures.
- D. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged enamel finish will not be permitted. Replace damaged or scratched materials with new materials.
- F. Floor-Anchored, Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inch into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- G. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 2800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Under-lavatory pipe supply covers.
- C. Electric hand/hair dryers.
- D. Utility room accessories.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate locations of accessories with other work to avoid interference, and to assure proper operation and servicing of accessory units.
 - 2. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.
- B. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.04 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- B. Samples: Submit two samples of each accessory, illustrating color and finish.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Commercial Toilet, Shower, and Bath Accessories:
 - 1. Bobrick Washroom Equipment, Inc.: www.bobrick.com.
 - 2. Other Acceptable manufacturers:
 - a. American Specialties, Inc: www.americanspecialties.com.
 - b. Bradley Corporation: www.bradleycorp.com.
- B. Basis of Design Electric Hand/Hair Dryer Manufacturer:
 - 1. Excel Dryer: www.exceldryer.com.
 - 2. Other Acceptable Manufacturers:
 - a. American Dryer, Inc: www.americandryer.com.
 - b. World Dryer Corporation: www.worlddryer.com.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
- B. Stainless Steel Sheet: ASTM A666, Type 304.
- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.
- F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
 - 1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
 - 2. Size: 18 inches wide by 24 inches high.
 - 3. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
 - 4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
 - 5. Basis of Design Products:
 - a. Bobrick; B-165.
- B. Grab Bars: Stainless steel, smooth surface.
 - 1. Standard Duty Grab Bars:
 - a. Push/Pull Point Load: 250 pound-force, minimum.
 - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 - c. Length and Configuration: 36 inches on rear, 42 inches on side) Horizontal Grab Bars designed for concealed mounting
 - d. Basis of Design Products:
 - 1) Bobrick; B-5806 Series.
 - 2. Mounting:
 - a. Stud walls: Bobrick; Series 256 Anchor Plate consisting of 3 inches wide by 12 gage anchor.
 - b. Toilet Partitions: Bobrick; 258 Series anchors, consisting of 16 gage, Type 304 stainless steel back plate.
 - c. Masonry Walls: Bobrick; 257 Series Anchors, consisting of 12 gage steel anchor plate, 10 gauge coated steel back plate and stainless steel machine screws.

2.05 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Under-Lavatory Pipe and Supply Covers:
 - 1. Insulate exposed drainage piping including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
 - 2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
 - 3. Construction: 1/8 inch flexible PVC.
 - a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - b. Microbial and Fungal Resistance: Comply with ASTM G21.
 - 4. Color: White.

5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.
6. Products:
 - a. Plumberex Specialty Products, Inc; Plumberex Trap Gear:
www.plumberex.com/#sle.
 - b. Truebro by IPS Corporation; Lav Guard 2 E-Z.

2.06 ELECTRIC HAND/HAIR DRYERS

- A. Electric Hand Dryers: Traditional fan-in-case type, with downward fixed nozzle.
 1. Operation: Automatic, sensor-operated on and off.
 2. Mounting: Surface mounted.
 3. Cover: Stainless steel with brushed finish.
 - a. Tamper-resistant screw attachment of cover to mounting plate.
 4. Provide Noise Reduction nozzle for reduction of air deflection noise and decibel level by 9db.
 5. Air Velocity: 18,000 linear feet per minute, minimum, at full power.
 6. Fan/Heater Control: Field adjustable down to approximately half-speed with corresponding reduction in heat output.
 7. Total Wattage: 1400 W, maximum.
 8. Runtime: Field adjustable or automatic, up to 35 seconds.
 9. Electric Hand Dryer Products:
 - a. Excel Dryer Inc; XLERATOR Stainless Steel XL-SB Hand Dryers:
www.exceldryer.com.

2.07 UTILITY ROOM ACCESSORIES

- A. Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, hat-shaped channel.
 1. Holders: Three spring-loaded rubber cam holders.
 2. Length: 24 inches.
 3. Products:
 - a. Bobrick; 223 X 24.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations and as indicated on Drawings, unless otherwise indicated.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide; current edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers; 2017.
- C. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Provide color and finish, anchorage details, and installation instructions.
 - 2. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
 - 3. Samples: For each type of exposed finish required.
 - 4. Samples for Verification: For each type of exposed finish required, prepared on Samples 6 by 6 inches square.
 - 5. Product Schedule: For fire-protection cabinets. Indicate whether semirecessed mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- B. Informational Submittals:
 - 1. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
 - 2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - 3. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.06 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fabricate and label fire extinguishers to comply with Title 19 CCR, Chapter 3, "Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.
- D. Provide fire extinguisher and cabinet from the same manufacturer.

2.02 MANUFACTURERS

- A. Basis of Design Manufacturer:
 - 1. JL Industries, Inc: www.jlindustries.com.
 - 2. Other Acceptable Manufacturers:
 - a. Larsen's Manufacturing Co: www.larsensmfg.com.mm
 - b. Potter-Roemer: www.potterroemer.com.

2.03 FIRE EXTINGUISHER CABINETS

- A. Fire Extinguisher Cabinets FEC-1:
 - 1. Basis of Design Product:
 - a. JL Industries, Inc; Clear VU 1516F: www.jlindustries.com.
 - b. Other Acceptable Manufacturers:
 - 1) JL Industries, Inc: www.jlindustries.com.
 - 2) Larsen's Manufacturing Co: www.larsensmfg.com.
 - 3) Prior approved equal.
 - 2. Fire Rating: Non-rated.
 - 3. Cabinet Type: SemiRecessed.
 - 4. Cabinet Material: Steel.
 - a. Color: White.
 - 5. Cabinet Trim Material: Steel sheet.
 - 6. Door Material: Steel sheet.
 - 7. Door Style: Full glass with frame, square edge.
 - 8. Door Glazing: 1/8 inch clear acrylic.
 - 9. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - a. Provide piano hinge permitting door to open 180 degrees.
 - 10. Accessories:
 - a. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - b. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 - c. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - 1) Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER", on cabinet door, red text, vertical alignment.
 - (a) Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
- B. Fire Extinguisher Cabinets FEC-2:
 - 1. Basis of Design Product:
 - a. JL Industries, Inc; Clear VU 1516FX2: www.jlindustries.com.
 - b. Other Acceptable Manufacturers:
 - 1) Larsen's Manufacturing Co: www.larsensmfg.com.
 - 2) Potter-Roemer: www.potterroemer.com.
 - 3) Prior approved equal.
 - 2. Fire Rating: Fire-Rated.
 - 3. Cabinet Type: SemiRecessed.
 - 4. Cabinet Material: Steel.
 - a. Color: White.
 - 5. Cabinet Trim Material: Steel sheet.
 - 6. Door Material: Steel sheet.
 - a. Finish: White.
 - 7. Door Style: Full glass with frame, square edge.
 - 8. Door Glazing: 1/8 inch clear acrylic.

9. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - a. Provide piano hinge permitting door to open 180 degrees.
10. Accessories:
 - a. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - b. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 - c. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - 1) Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER", on cabinet door, red text, vertical alignment.
 - (a) Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.

2.04 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage, with monoammonium phosphate-based dry chemical in enameled-steel container.
 1. Stored Pressure Operated: Deep Drawn.
 2. Class: 4-A:80-B:C.
 3. Size: 10 pound.
 4. Size and classification as scheduled.
 5. Finish: Baked polyester powder coat, red color.
- C. Carbon Dioxide Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
 1. Class: B:C type.
 2. Size: 10 pound.
 3. Finish: Baked polyester powder coat, Red color.
 4. Temperature range: Minus 40 degrees F to 120 degrees F.

2.05 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

2.06 MATERIALS:

- A. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 1. Finish: Baked enamel or powder coat.
 2. Color: White.
- B. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished).

2.07 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 1. Weld joints and grind smooth.

2. Provide factory-drilled mounting holes.
 3. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
1. Fabricate door frames of one-piece construction with edges flanged.
 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 PREPARATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level , 54 inches from finished floor to top of fire extinguisher or as indicated on Drawings.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

3.04 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 10 6010
INTERIOR CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Posts, rails, and frames.
- B. Wire fabric.
- C. Manual gates with related hardware.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete anchorage for posts.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2017).
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2018.
- E. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2014a.
- F. CLFMI CLF-PM0610 - Product Manual; 2017.
- G. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.

1.04 SUBMITTALS

- A. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.
- C. Manufacturer's Installation Instructions: Indicate installation requirements, post foundation anchor bolt templates.
- D. Manufacturer's Qualification Statement.
- E. Fence Installer Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.

1.06 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. Provide five year manufacturer warranty.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Posts, Rails, and Frames:
 - 1. Formed from hot-dipped galvanized steel sheet, ASTM A653/A653M, HSLAS, Grade 50, with G90 (Z275) zinc coating.

2. Line Posts: Type I round.
 3. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round.
 4. Conform to CLFMI CLF-PM0610.
- B. Wire Fabric:
1. ASTM A392 zinc coated steel chain link fabric.

2.02 COMPONENTS

- A. Line Posts: 2.38 inch diameter.
- B. Corner and Terminal Posts: 2.88 inch diameter.
- C. Gate Posts: Less than 6 feet wide, 3-1/2 inch diameter.
- D. Gate Posts: 6 feet to 13 feet wide, 4-1/2 inch diameter.
- E. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.
- F. Bottom Rail: 1.66 inch diameter, plain end, sleeve coupled.
- G. Gate Frame: 1.90 inch diameter for welded fabrication.
- H. Fabric: 2 inch diamond mesh interwoven wire, 6 gage, 0.1920 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.
- I. Tension Wire: 6 gage, 0.1920 inch thick steel, single strand.

2.03 MANUAL GATES AND RELATED HARDWARE

- A. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.
- B. Hardware for Sliding Gates:
 1. Fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.
 2. Rollers: Provide four steel wheeled rollers for support and operation of cantilevered sliding gates. Rollers shall be 6 inch diameter and shall be mounted on fence posts at top and bottom of gate.

2.04 ACCESSORIES

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.
- C. Extension Arms: Cast steel galvanized, to accommodate 3 strands of barbed wire, single arm, vertical.

2.05 FINISHES

- A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot.
- B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.
- C. Accessories: Same finish as framing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that areas are clear of obstructions or debris.

3.02 PREPARATION

- A. Removal: Obstructions or debris.

3.03 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Place fabric on outside of posts and rails.
- C. Set intermediate posts plumb.

1. Locate line posts at intervals not exceeding 10 feet. Set posts in holes cored in the concrete floor slab. Fill annular space between the post and hole with non-shrink grout after posts have been plumbed and aligned. At contractor's option and if approved by the Owner, anchor posts to the floor through oval flanges welded or threaded to the bottom of the pipe. Minimum of two concrete threaded anchors to be provided for anchoring each post. Provide four anchors for end, corner and pull posts.
 2. Reinforce selected line, end and corner posts by means of angles welded to the tops of posts and bolted and/or welded to roof steel as required for fence stability. Anchor end posts to intersecting masonry walls with U-shaped clamps bolted to wall.
- D. Line Post Footing Depth Below Finish Grade: ASTM F567.
- E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.
- F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
- H. Install a 7 gage, 0.1770 inch coil spring wire in place of top rail.
- I. Install center brace rail on corner gate leaves.
- J. Do not stretch fabric until concrete foundation has cured 28 days.
- K. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- L. Position bottom of fabric 2 inches above finished grade.
- M. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- N. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- O. Install bottom tension wire stretched taut between terminal posts.
- P. Do not attach the hinged side of gate to building wall; provide gate posts.
- Q. Install hardware and gate with fabric to match fence.
- R. Peen all bolts upon installation.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.
- C. Do not infringe on adjacent property lines.

3.05 CLEANING

- A. Leave immediate work area neat at end of each work day.
- B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.
- C. Clean fence with mild household detergent and clean water rinse well.
- D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.
- E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.

END OF SECTION

SECTION 12 3600 COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.
- B. Wall-hung counters and vanity tops.

1.02 REFERENCE STANDARDS

- A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. AWI (QCP) - Quality Certification Program; current edition at www.awiqcp.org.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- G. PS 1 - Structural Plywood; 2009.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- B. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- C. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, minimum size 12 inches square, representing actual product, color, and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- G. Installation Instructions: Manufacturer's installation instructions and recommendations.
- H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
- C. Quality Certification:
 - 1. Comply with AWI (QCP) woodworking association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
 - 2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) requirements for grade or grades specified.
 - 3. Provide designated labels on shop drawings as required by certification program.
 - 4. Provide designated labels on installed products as required by certification program.

5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 deg F and 90 degrees F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.
- D. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 1. Flat Sheet Thickness: 1/2 inch, minimum.
 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Basis of Design Manufacturers:
 - 1) Avonite Surfaces: www.avonitesurfaces.com.
 - b. Color and Pattern: As selected by Owner from manufacturer's full line..
 3. Other Components Thickness: 1/2 inch, minimum.
 4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 5. Fabricate in accordance with AWI/AWMAC/WI (AWS), Section 11 - Countertops, Premium Grade.
- C. Stainless Steel Countertops: ASTM A666, Type 304, stainless steel sheet; 16 gage, 0.0625 inch nominal sheet thickness.
 1. Finish: 4B satin brushed finish.
 2. Edge and Backsplash Details: As indicated on drawings.

2.02 MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.

- C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 - 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- D. Stainless Steel: Fabricate tops up to 144 inches long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
 - 1. Weld joints; grind smooth and polish to match.
 - 2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where indicated on drawings.
 - 3. Provide wall clips for support of back/end splash turndowns.
 - 4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
- E. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach stainless steel countertops using stainless steel fasteners and clips.
- C. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

DIVISION 21 – FIRE SUPPRESSION

SECTION 21 0500

FIRE PROTECTION SYSTEMS

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

Scope of work included under this Section of the Specifications consists of furnishing all labor, materials, tools, equipment and supplies required for the design, fabrication and installation of fire protection systems in accordance with requirements shown on the Site Utilities and Sprinkler Requirement Plans. Work shall include the following:

Wet pipe sprinkler systems throughout the office areas.

Wet pipe sprinkler systems under owner equipment platforms, etc., material handling conveyors which are greater than 2' in width.

Applicable provisions of the General Conditions and Division 1 of the Technical Specifications are included in the scope of this section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

Fire Protection Specialties; Section 10 4400

Basic Materials and Methods; Section 23 0500

Fire Alarm System; Section 26 7210 - By Electrical Contractor

Wiring of Suppression System Controls; Section 26 7210 - By Electrical Contractor.

1.03 MECHANICAL GENERAL PROVISIONS:

Sprinkler systems shall be designed and installed in accordance with requirements of N.F.P.A. 13, "Standard for Installation of Sprinkler Systems", Latest Edition, and F.M.2-2 "Early Suppression Fast Response (ESFR) Sprinklers", based upon hydraulic requirements shown on the drawings.

All piping shall be supported and installed in accordance with NFPA Seismic Restraint requirements.

System designs, materials, equipment, and installations shall further comply with F.M. requirements. All products to be Factory Mutual (F.M.) approved as applicable.

SECTION 21 0500; FIRE PROTECTION SYSTEMS

1.04 SUBMITTALS:

Shop Drawings and Hydraulic Calculations: Submit one electronic copy of interior sprinkler system design and installation drawings to the Engineer and one copy to the insurer for approval prior to the start of any shop fabrication work. Drawings shall bear the F.M. stamp of approval, noting that the submitted designs have been reviewed and meet requirements for adequate fire protection. Coordinate shop drawings with project working drawings to avoid conflicts between sprinkler piping and building services. Unavoidable conflicts shall be called to the attention of the Engineer.

Calculation shall include additional friction loss for each fitting as outlined in Factory Mutual Data Sheet 2-8N, Section 7-4.2.1 when roll grooved piping is used.

Manufacturer's Data: Submit one electronic copy of manufacturer's literature and specification sheets describing all materials and equipment comprising the fire protection system. Materials and equipment shall not be ordered until Contractor receives approved copies of this data from the Engineer.

1.05 COORDINATION OF WORK:

Refer to Division 1 Sections for general requirements applicable to the entire work.

For purposes of clearness and legibility, drawings are essentially diagrammatic, and although the size and location of equipment is drawn to scale whenever possible, the contractor shall make use of all data in all of the contract documents and shall verify this information at the site.

Drawings do not indicate all equipment and potential obstructions. It shall be the work of this section to make the installation in such a manner to conform to the structure, avoid obstructions, and preserve headroom.

1.06 PRODUCT DELIVERY, HANDLING AND STORAGE:

Use all means necessary to protect materials and equipment before, during and after installation, and to protect work and materials of all other trades. Where possible, pipe and other materials subject to weather damage shall be stored inside. Where materials and equipment must be stored outside, such items shall be elevated well above grade and covered with a durable, waterproof wrapping.

Damaged materials shall be repaired or replaced as necessary. Repairs shall be subject to the approval of the Engineer and completed at no additional cost to Owner.

SECTION 21 0500; FIRE PROTECTION SYSTEMS

PART 2 - PRODUCTS:

2.01 GENERAL:

All materials and equipment shall be UL listed and F.M. approved where applicable.

2.02 EXCAVATION AND BACKFILLING:

Refer to Section 31 2000 for soil and granular backfill requirement.

2.03 ABOVEGRADE PIPE AND FITTINGS:

2" and Smaller: Black steel pipe, Schedule 40, complying with requirements of ASTM A-795, Latest Edition. Fittings shall be roll grooved type, 175 psi working pressure. At contractor's option, pipe may be Schedule 40 with threaded fittings or light weight (thinner wall than Schedule 10 piping voluntary deduct may be given to be approved by Owner & Insurer.

2-1/2" Through 5": Black steel pipe, Schedule 10, complying with requirements of ASTM A135, Latest Edition. Fittings shall be rigid flexible type couplings with sealing gaskets, Victaulic, Firelock Style 005/009, or equal, 300 psi working pressure. At contractor's option, pipe may be Schedule 40 with threaded fittings. Light weight (thinner wall than Schedule 10 piping voluntary deduct may be given to be approved by Owner & Insurer.

6": Black steel pipe, .134" wall thickness (Schedule 10), complying with requirements of ASTM A-795, Latest Edition. Fittings shall be rigid type couplings with sealing gaskets, Firelock Style 005/009, or equal, 300 psi working pressure.

Steel piping with wall thicknesses less than Schedule 40 shall not be joined by threaded fittings or with fittings used with pipe having cut grooves.

2.04 SPRINKLER HEADS:

Provide upright type in unfinished areas and pendant type in all areas required by the drawings to have finished ceilings. Sprinkler heads shall be ASCOA, Grinnell/Tyco, Reliable, Viking, or equal, with temperature ratings as required by the drawings or by insurance company requirements, UL listed, and F.M. approved. Upright sprinklers to be furnished with a brass finish. Pendant type sprinklers to be furnished with a bright chrome finish and a maximum 1/2" thick, chrome plated escutcheon. At option of Contractor, pendant type heads in finished offices may be recessed type, installed in recessing cup.

ESFR, "quick response" type, sprinkler heads to be Reliable, Central, Grinnell/Tyco,

SECTION 21 0500; FIRE PROTECTION SYSTEMS

Viking, or equal, UL listed, F.M. approved.

Provide a cabinet mounted on the wall at each riser location for storing emergency heads. Fill the box with heads and sprinkler wrench.

2.05 BRAIDED FLEXIBLE SPRINKLER DROP (SUSPENDED CEILING)

Viking VKFD, or equal, stainless steel corrugated flexible tube and braid, 1" inlet nipple for attaching to system branch piping and straight or angle outlet reducer fitting for attaching to sprinkler head, galvanized steel support bar and brackets to secure assembly to suspended ceiling support rails, FM approved.

PART 3 - EXECUTION:

3.01 GENERAL:

Materials and equipment shall be installed in a neat and workmanlike manner by competent specialists of the trade. Installation of equipment not meeting these standards shall be rejected by the Engineer and shall be removed and reinstalled by the Contractor at no additional cost to the Owner.

3.02 CUTTING AND PATCHING:

Contractor shall carefully and accurately lay out his work, locating each and every pipe line and riser, and shall furnish wet sleeves where same pass through floor and wall construction while same is in process of erection.

Cutting and repairing must be done by the contractor at his own expense. Sleeves shall be the net thickness of floors or walls finishing flush with floor surface, or flush with face of walls.

At the point where piping passes through walls, floors or ceilings, contractor shall provide pipe sleeves and chrome plated escutcheons. Space between pipe and sleeve in exterior walls shall be filled with sealant.

3.03 SPRINKLER SYSTEMS:

All components of the interior sprinkler systems, including pipe, pipe supports, sprinkler heads, interior hose stations, etc., shall be installed and tested in accordance with provisions of N.F.P.A. Standard #13 and F.M. requirements.

Coordinate wiring of waterflow and monitor switches with electrical contractor.

SECTION 21 0500; FIRE PROTECTION SYSTEMS

Piping hung in metal buildings shall be supported from the purlin mid point or a stiffener angle. No support form only the purlin lip shall be permitted.

Hanger Rod Locations: When hanger rods are supported from the bottom of a bar joist, the rod should be installed within 3" of the panel point (point where bar connects to bottom chord) or the joist must be reinforced from the bottom chord to the top chord at the point where the hanger rod is installed. This requirement applies to all rods supporting individual pipes larger than 3". Refer to the structural drawings for reinforcement details.

3.04 TESTING:

Contractor, under this section of the specifications, shall conduct testing of all equipment and piping systems furnished and installed. All equipment required for the testing shall be furnished by the contractor. All tests shall be conducted in the presence of the Engineer, Owner or local fire marshall.

All tests shall be conducted at such places and times to permit all work to proceed with as little interruption as possible. Tests shall be made before any of the work is covered or concealed. Flush mains with water flowing at 10 FPS minimum velocity.

Piping shall be tested under a hydrostatic pressure of 200 psi minimum or 50 psi in excess of the working pressure above 150 psi for a period of 2 hours. Fill system with water, expel all air and pump the lines to pressure. Detected leaks shall be repaired and the test repeated until the system is free of leaks.

Contractor to complete "Contractor Material and Test Certificates" for underground/aboveground pipe and submit to Owner and F.M.

DIVISION 22 - PLUMBING

SECTION 22 0600

PLUMBING

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

Scope of work included under this Section of the Specifications consists of furnishing all labor, materials, tools, equipment and supplies required to complete installation of domestic water and waste/drainage piping systems to the extent shown on the drawings. Work shall include the following major systems:

Supply and installation of underground sanitary sewer system for all plumbing fixtures to the existing building sewer system. System shall consist of soil, waste and vent piping, cleanouts and floor drains.

Supply and installation of domestic cold water distribution system, consisting of pipe, fittings, valves, insulation, etc. and including required connections to plumbing fixtures, sinks, water heaters and other equipment shown on the drawings.

Supply and installation of hot water distribution system, consisting of pipe, fittings, valves, pipe insulation, water heaters, etc., and including all required connections to lavatories and sinks.

Supply and installation of condensate drain traps on each HVAC unit and piping to storm drain.

Applicable provisions of the General Conditions and Division 1 of the Technical Specifications are included in the scope of this section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

Plumbing Vent Roof Flashing; Section 07 5000 Series

Painting/Pipe Identification; Division 09

Basic Materials and Methods; Section 23 0500

Plumbing Fixtures and Trim; Section 22 4000

SECTION 220600; PLUMBING
HVAC Condensate Drains; Section 23 0600

Supply and installation of disconnect switches that are not normally factory mounted; Section 26 0500

1.03 MECHANICAL GENERAL PROVISIONS:

Comply with requirements specified in Section 23 0500; Part 1 as applicable.

Soil, waste and drain pipe systems shall comply with applicable standards of the Plumbing and Drainage Institute (PDI) as well as requirements of the governing plumbing code and municipal regulations.

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with requirements of Section 23 0500, Par. 2.01.

2.02 SANITARY SEWER SYSTEM:

Pipe and Fittings:

Sanitary sewer piping (soil, waste and vent piping) shall be PVC (ASTM D1784) DWV pipe, complying with ASTM D2665. Fittings shall be solvent cemented, socket weld type complying with ASTM D2665. Solvent cement shall comply with ASTM D2564 using the joining procedure described in ASTM D2855.

Reducing fittings or recessed reducers shall be utilized for all soil, waste and/or drain pipe size changes. All changes in direction of this piping shall be by appropriate use of 45° wyes, half wyes, long-sweep, 1/4, 1/6, 1/8, or 1/16 bends, etc. Exceptions are the use of sanitary tees on vertical stacks and short quarter elbows on soil and waste lines where the change of direction is from a vertical plane to a horizontal plane.

Traps: Each fixture and piece of equipment requiring connection to the sanitary sewer system shall be equipped with a standard "P" trap.

Cleanouts: Cleanouts shall be provided at each change of direction in building drain of over 45°, at end of each soil and waste branch and at intervals not exceeding 100' in horizontal runs. Cleanouts shall be the same size as pipe up to 4". Piping above 4" in size shall be equipped with 4" cleanouts. Cleanouts for specific application shall be as specified below:

Cleanouts in unfinished concrete floors and yard cleanouts shall be of cast iron construction, Zurn Z-1400-Z or equal, by Wade or Smith, consisting of heavy-duty,

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round, cast iron, scoriated top; gas and water tight, brass or plastic seal plug; countersunk head and anchoring flange.

Cleanouts in finished floors shall be of cast iron construction, gas and watertight seal plug, adjustable threaded housing and collar, with bronze, heavy duty, scoriated top. Cleanouts shall be Zurn ZB-1400HD or equal, by Wade or Smith.

Cleanouts in walls shall be Zurn Z-1468 or equal by Wade or Smith, consisting of bronze plug and stainless steel cover.

Floor Drains:

"FD-1" - Finished Floors: Zurn ZB415-B or equal by Wade or Smith, cast iron drain with flange and weep holes, caulked bottom outlet, round top iron adjustable collar with roll thread, Type B, polished bronze strainer. Each drain shall be provided with independent deep-seal type "P" trap with 4" minimum water seal to prevent odors.

"FD-2" - Industrial Areas: Zurn Z520 or equal by Wade or Smith, cast iron drain with flange and weep holes, caulked bottom outlet, round top adjustable frame and heavy duty slotted grate. Each drain shall be provided with independent deep-seal type "P" trap with 4" minimum water seal to prevent odors.

2.04 CONDENSATE DRAIN SYSTEM:

Pipe and Fittings: Condensate piping from interior air handling units shall be copper type "L" complying with ASTM B88 with solder joint fittings and ½" fiberglass insulation.

Traps: Provide at each ATO, unless internally trapped by manufacturer, and at each interior air-handling unit connected to condensate drainage system.

2.05 DOMESTIC HOT AND COLD WATER PIPING, FITTINGS AND VALVES:

Pipe and Fittings:

3" and Smaller: Type "L" hard drawn copper tube, complying with ASTM B88 and wrought copper, solder-joint fittings, complying with ANSI B16.22. Solder shall be 95-5 composition with noncorrosive flux. At contractor's option Schedule 40 galvanized steel with threaded fittings and complying with ASTM A53 may be used.

Unions:

Copper: Wrought copper, ground joint with copper-to-copper seats and with solder ends.

Steel Pipe: 150# Class, malleable iron, ground joint with bronze-to-iron seats.

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Unions shall be galvanized steel.

Steel Pipe: Flanged type. Flanges shall be galvanized steel, complying with requirements of ANSI B16.5. Gasket materials shall be non-asbestos composition, complying with requirements of ANSI B16.21.

Valves: Valves shall be provided at all points of equipment connection and for the control of major branch lines.

3" and Smaller: Ball valves, 600# Class, bronze construction, Teflon seats. Valves shall be Milwaukee BA150, or equal, with socket joint or Milwaukee BA-100, or equal, with threaded ends.

Pipe Hangers and Supports: Comply with requirements specified in Section 23 0500. Use copper hangers, etc. with uninsulated copper tube/pipe.

Pipe Insulation Protection: Comply with requirements specified in Section 23 0500.

Pipe and Fitting Insulation: Fiberglass insulation, complying with the requirements specified in Section 230500. Insulation thickness shall be as follows:

Cold Water	-	1/2"
Hot Water	-	1"

Fitting insulation thickness shall be equal to that specified for pipe insulation.

2.06 VACUUM BREAKERS:

Watts, Model 288A or equal by Sloan or Zurn. Provide at points of possible contamination of the domestic water supply. Use Model 800 at points of continuous pressure.

2.07 WATER HAMMER ARRESTERS:

Provide where shown on the drawings. Unit shall be sized in accordance with Plumbing and Drainage Institute Standard PDI-WH201. Water hammer arresters shall be Zurn "Shoktrol" Z-1700 or equal, of the size noted on the drawings with nesting-type air pre-charged bellows with bellows and casing constructed of stainless steel.

2.08 WATER HEATERS:

General: Meet ASHRAE 90 Standard for energy efficiency and provide 3 year tank warranty for commercial use.

Electric: A.O. Smith or equal by State or Jackson, DSE or DEN Series, Commercial

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Electric Water Heater with storage and heating capacity as noted on the drawings. Water heater shall be prewired, factory tested and have the U.L. seal of approval. Storage tank shall be completely glass-lined. Tank shall be designed for a 150 psi working pressure and shall be completely insulated with blanket fiberglass insulation, protected by a heavy gauge steel jacket.

Water heater shall be equipped with adjustable temperature control and high temperature cutoff. Heater shall be furnished complete with temperature and pressure relief valve, drain valve and all required accessories.

Electric: Eemax model SP or equal, for point of use service, 227V, 3.0kw, field serviceable nickel-chrome element, UL listed.

2.09 TRAP GUARD:

ProSet Trap Guard, or equal, elastomeric, normally closed trap guard device provided at all floor drains. Device has a normally closed seal to prevent evaporation of the trap seal and also protect against sewer gases from backing up into habitable areas. It opens with fluid and allows liquid drainage to flow through into the building drain.

2.10 GARBAGE DISPOSAL (GD-1):

InSinkErator "Evolution Excel," or equal, garbage disposal, with 40 oz chamber capacity, stainless steel finish, 1.0 HP, 115V single phase; wall switch, UL listed. Permanently lubricated upper and lower bearings and motor overload protection. 7 year Service Warranty.

PART 3 - EXECUTION:

3.01 GENERAL:

Comply with requirements of Section 23 0500, par. 3.01.

Water lines shall be run level, at elevations required to avoid interferences with other services and as further required to preserve maximum headroom.

Soil, waste and drain piping shall be laid at a slope of 1/16"/foot or to inverts shown on the drawings.

Vent piping shall be graded so as to drain back to soil or waste pipe.

Floor drains shall be set recessed with floor and shall be flashed as required.

Disinfection of Potable Water System: After the water piping system has been completed,

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tested and approved, contractor shall sterilize the entire water system. System shall be drained and refilled with a solution containing 50 gpm of available chlorine and allowed to stand 6 hours before flushing and returning to service. Following sterilization, system shall be thoroughly flushed through all fixtures and outlets to remove all traces of the sterilizing solution. AWWA C 651 "Disinfection of Water Mains" may be followed as an alternate to this procedure.

After completion of the work, contractor shall furnish the Engineer with a letter certifying that the water system has been approved by the local Health Department.

3.02 PLUMBING VENT PIPE FLASHINGS:

Comply with requirements in Section 075000.

3.03 PIPING:

Comply with applicable requirements specified in Section 23 0500, Par. 3.03 for General, Pipe Joints, and Pipe Cleaning.

Painting/Identification:

Paint process water piping yellow and identify it with "non-potable" markings.

3.04 PIPE INSULATION:

Comply with requirements specified in Section 23 0500.

3.05 CUTTING AND PATCHING:

Comply with requirements specified in Section 23 0500.

3.06 EXCAVATION AND BACKFILLING:

Comply with requirements specified in Section 23 0500.

3.07 EQUIPMENT:

All plumbing equipment required under this section of the specifications shall be installed in accordance with the manufacturer's instructions and standard plumbing practices.

Provide valves on both sides of water heater to enable removal of unit.

Locate wall hydrants 2'6" above finished floor or as noted on plans.

3.08 TESTING:

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Contractor, under this section of the specifications, shall conduct testing of all equipment and piping systems furnished and installed. All equipment required for the testing shall be furnished by the contractor. All tests shall be conducted in the presence of the Engineer or Owner.

All tests shall be conducted at such places and times to permit all work to proceed with as little interruption as possible. Tests shall be made before any of the work is covered or concealed.

All sanitary and storm sewer pipe shall be tested for leaks. Pipes and vent lines shall be capped or plugged and lines shall be filled with water to the top of vents above the roof and allowed to stand until a thorough inspection has been made. Detected leaks shall be repaired and the system retested. When testing the system by sections, the minimum height of the water column shall be 10'. No rosin, glass fillers, cement, candle wax or any other substance shall be used for stopping leaks in cast iron.

Smoke testing of sewer lines may be utilized in lieu of the above-specified water testing if approved by the local authorities.

Hot and cold water piping shall be tested under a compressed air pressure of 140 psi for a period of 2 hours. Detected leaks shall be repaired and the test repeated until the system is free of leaks.

DIVISION 22 PLUMBING

SECTION 22 4000

PLUMBING FIXTURES AND TRIM

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

Work included under this section shall consist of furnishing all labor, materials, tools, equipment and supplies required for installation of plumbing fixtures and related trim as shown on the drawings.

Applicable provisions of the General Conditions and Division 1 of the Technical Specifications are included in the scope of this section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

Cutting and Patching; Section 23 0500

Soil, Waste and Vent Pipe Connections; Section 22 0600

Hot and Cold Water Connections; Section 22 0600

1.03 MECHANICAL GENERAL PROVISIONS:

Comply with requirements specified in Section 23 0500, Part 1.

Comply with provisions of CABO/ICC/ANSI A117 "Accessible and Usable Buildings and Facilities".

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with requirements specified in Section 23 0500.

2.02 WATER CLOSETS:

Water Closets - "WC-1": Wall-mounted, vitreous china, siphon jet action, low consumption type (1.6 gallons/flush) with elongated bowl and 1-1/2" top spud. Water closets shall be American Standard "Afwall" 2257.103 or equal. Water closets shall be complete with solid plastic, extra-heavy, open front seats with stainless steel hinge posts

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and concealed check; American Standard 5320.114 or equal, white color. Each water closet shall also be equipped with a flush valve with 1" stop and vacuum breaker. Provide automatic flushing with Sloan Royal 111 ES-S TMO "Royal" Flushometer (1.28 gal./flush) with true mechanical override, including flush valve with integral stop and vacuum breaker, electric solenoid operator (24V), 120/24V transformer, and sensor, UL approved.

Water Closets - "WC-2": Same as "WC-1" except mounted at height required by Accessibility Guidelines.

2.03 URINALS:

"UR-1": Wall-mounted, vitreous china, siphon jet, water low consumption (0.125 gallons/flush), 3/4" inlet spud, 2" outlet, American Standard "Washbrook" 6590.503 or equal, 14" minimum wall to lip dimension complying with ANSI A112. Provide automatic flushing with Sloan Royal 111 ES-S TMO "Royal" Flushometer (0.125 gal./flush) with true mechanical override, including flush valve with integral stop and vacuum breaker, electric solenoid operator (24V), 120/24V transformer, and sensor, UL approved.

"UR-2": Same as "UR-1" except mounted with rim 17" above floor for wheelchair use.

2.04 SERVICE SINKS:

"SS-1": American Standard or equal, 7741.000 "Florwell" cast iron, acid-resistant enameled, corner model, floor-mounted with curbed front, complete with 8341.076 "Heritage" dual control faucet with exposed vacuum breaker assembly, bucket hook and 3/4" hose outlet; 7721.038 strainer and drain; 7745.811 removable vinyl coated rim guard; and 3" standard "P" trap.

2.05 SINKS:

"S-1": Elkay "Lustertone" LR-1918, or equal, single compartment, 18 ga. stainless steel, self-rimming sink with ledge back. Sink shall be 19" long x 18" wide x 7-5/8" deep with bowl measuring 16" long x 11-1/2" wide. Sink shall be fitted with faucet holes as required for the specified faucet.

Sink shall be fitted with American Standard 4205.000, Reliant kitchen faucet, or equal, consisting of chrome lever handle with set screw, 3/8" copper tubing inlets and adjustable swing spout with aerator, 2.2 gpm. Sink shall be further fitted with American Standard or equal, 4331.013 crumb cup strainer of all-brass construction with a rubber stopper, 3-1/2" outlet and 1-1/2" x 4", 20 ga. tailpiece with brass locknut and coupling nut. Trim shall be furnished with a chrome finish.

Supply pipe assembly shall be American Standard 2303.154, or equal, consisting of 3/8" wheel handle angle valve, 3/8" male thread outlet, escutcheon and 3/8" x 12-3/4" flexible tube riser. Assembly shall be furnished with a chrome finish.

SECTION 22 4000; PLUMBING FIXTURES AND TRIM

2.06 WASH FOUNTAINS:

"WF-1": Bradley "Sentry" SN2004 or equal, 5" deep shallow bowl Barrier Free wash fountain specifically designed to be accessible. Wash fountains shall be 54" semi-circular with supplies and vent through wall. Bowl and pedestal shall be stainless steel. Pedestal side panels shall be stainless steel. Water shall be controlled by infrared sensor-actuated control, field adjustable from 0-60 seconds. Other features shall include check valves, thermostatic mixing valve and liquid soap dispenser.

2.07 ELECTRIC WATER COOLERS:

"EWC-1": Wall-mounted, self-contained, split-level, electric refrigerated water cooler with a cooling capacity of 8 gph of 50°F water, based upon ambient temperature of 90° and inlet water temperature of 80°F. Refrigerant to be R134a or environment friendly with no chlorine. Fountain top shall be furnished with a stainless steel top and cabinet shall be heavy gauge steel with vinyl finish or powder coated. Unit shall be Oasis, Model PR8ACSL, Sunroc NWCA-8F-BL or equal, push pad activation, ADA compliant, lead free materials and construction of waterways, UL listed, NSF certified.

2.08 FIXTURE CARRIER:

General: Carriers required with gypsum board walls at chases. Bolts, etc., may be used with concrete block chases and structural columns.

Urinal Carrier: Zurn Z1222, Wade, Smith or equal, with fixture bolts, mounting plate, bearing plate, steel pipe uprights, block bases and chrome plated trim.

Water Closet Carriers: Zurn Z1203 Series, Wade, Smith or equal, with horizontal adjustable face plate in single or back-to-back arrangements as required by the drawings. For support of wall-mounted handicapped water closets, carriers shall be Zurn Z1207 Series, suitable for single or back-to-back installations.

Water Cooler Carrier: Zurn Z1225, Wade, Smith or equal, with fixture bolts, mounting plate, bearing plate, steel pipe uprights and block bases. Carrier for column-mounted fountains shall consist of fixture bolts and mounting and bearing plates welded or bolted to columns.

2.09 ACCESSIBLE LAVATORY GUARD KIT

Truebro, Inc. "Handi Lav-Guard Model" 101 or equal, white molded closed cell vinyl insulation, nylon fasteners for installation on P-trap and hot water valve/supply tube.

PART 3 - EXECUTION

SECTION 22 4000; PLUMBING FIXTURES AND TRIM

3.01 GENERAL:

Comply with applicable requirements specified in Section 23 0500.

3.02 FIXTURE INSTALLATION:

All plumbing fixtures shall be installed in accordance with manufacturer's recommendations and rough-in drawings.

Accessible water closets shall be installed at 17"-19" floor to top of toilet seats. Standard height is 15".

Accessible urinals shall be installed 17" floor to elongated rim. Standard height is 22".

Lavatories shall be installed at 34" maximum floor to rim or counter surface.

Mount EWC-1 water coolers 40" above floor (floor to top of unit) and EWC-2 "barrier free" coolers 36" floor to spout outlet.

Plumbing fixtures shall be beaded and caulked along joints at walls, countertops and other intersecting surfaces utilizing approved caulking compounds.
Insulate hot water and drain pipe under accessible lavatories with insulation guard kit.

Provide stops on water supplies to all plumbing fixtures.

Remove labels/peel off coating from showers, and clean rest room fixtures.

DIVISION 23 - HVAC

SECTION 23 0500

BASIC MATERIALS AND METHODS

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

Scope of work included under this Section of the Specifications consists of furnishing all labor, basic materials, tools, equipment and supplies required for installation of plumbing, piping, HVAC, and fire protection systems specified in companion sections of Division 23. Work specified under this section includes the following:

Mechanical General Provisions.

Requirements for Basic Materials such as; motors, starters and controls, equipment supports, pipe specialties, pipe insulation, and pipe hangers/supports, etc.

General requirements for pipe and equipment installation, including cutting and patching, excavation and backfill for underground piping systems, pipe installation, pipe insulation, painting, identification and testing.

Applicable provisions of the General Conditions and Division 1 of the Technical Specifications are included in the scope of this Section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

Trench Excavation and Backfill; Section 31 2000

Cast-in-Place Concrete; Section 03 3000

Metal Fabrications; Section 05 5000

Painting/Pipe Identification; Division 09

Fire Protection System; Section 21 0500

Domestic Water Piping System; Section 22 0600

Sanitary and Storm Piping System; Section 22 0600

Plumbing Fixtures and Trim; Section 22 4000

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Heating, Ventilating and Air Conditioning Equipment; Section 23 0600

Air Distribution; Section 23 3300

Installation of Remote Starters and Disconnects for HVAC Equipment and Plumbing Equipment; Section 26 0500

Power and Control Wiring of HVAC and Plumbing Equipment; Section 26 0500

1.03 COORDINATION OF MECHANICAL WORK:

Refer to Division 1 Sections for general requirements applicable to the entire work.

For purposes of clearness and legibility, drawings are essentially diagrammatic, and although the size and location of equipment is drawn to scale whenever possible, the contractor shall make use of all data in all of the contract documents and shall verify this information at the building site.

Drawings indicate required size and points of termination of pipes and ducts and suggest proper routes to conform to the structure, avoid obstructions and preserve clearances. However; it is not intended that the drawings indicate all necessary offsets, and it shall be the work of this Section to make the installation in such a manner to conform to the structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further cost to the Owner.

Operating and control equipment shall be properly located so as to be readily accessible for maintenance.

1.04 CODES AND STANDARDS:

All work shall conform to requirements of local and state codes, laws and standards governing this work and to additional Standards referenced in this and subsequent sections of Division 23. Any conflicts between codes, laws, and standards, and requirements of the drawings and specifications shall be called to the attention of the Engineer prior to submission of the bid. Failure to comply with this requirement shall obligate the contractor to execute all work required to achieve compatibility between codes/standards and the contract documents.

Codes and Standards include, but are not limited to the following:

AABC	Associated Air Balance Council
AASHTO	American Association of State Highway & Transportation Officials
ADAAG	Americans with Disabilities Act Accessibility Guidelines
ADC	Air Diffusion Council

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AGA	American Gas Association/ See CSA
AMCA	Air Moving & Conditioning Association
ANSI	American National Standards Institute
ARI	Air Conditioning & Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration & Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing & Materials
AWWA	American Water Works Association
CABO	Council of American Building Officials
CSI	Cast Iron Institute
EPACT	Energy Policy Act
ETL	ETL Testing Laboratories/ See ITSNA
ITSNA	Intertek Testing Services NA (was ETL)
MSS	Manufacturers Standardization Society
NEBB	National Environmental Balancing Bureau
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NRTL	Nationally Recognized Testing Laboratory (OSHA)
NSF	NSF International (Public Health & Safety Company)
OSHA	Occupational Safety & Health Act
PDI	Plumbing and Drainage Institute
SMACNA	Sheet Metal & Air Conditioning Contractors National Association
UL	Underwriter's Laboratories, Inc.
SEI	Safety Equipment Institute
ICC	International Code Council (International Code)
FM	Factory Mutual

Design and construction of safety devices (shoring, etc.) for trench excavation shall be the responsibility of the contractor in compliance with OSHA guidelines and governing regulations.

All work shall be subject to such inspections and test as shall be required by the municipal authorities and as required in subsequent sections of Division 23.

1.05 GUARANTEES:

Contractor shall guarantee all work installed by him against all defects in materials and workmanship for a period of one year after completion and acceptance. He shall repair or replace any such defective work upon notification by the Engineer or Owner.

1.06 SUBMITTALS:

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Within 30 days after the contract award, the contractor shall submit to the Engineer for approval, 1 electronic copy of shop drawings, performance data, etc., relating to all materials and equipment specified in this and subsequent sections of Division 23. Submittal data shall be presented in sections designating the different specification sheets.

Prior to the presentation of the submittals to the Engineer, the contractor shall review shop drawings and product data to verify field measurements, field construction criteria, catalog numbers and similar data. Contractor shall coordinate each submittal with requirements of the work and other contract documents.

Contractor's responsibility for errors and omissions in submittals is not relieved by the Engineer's review and acceptance of such submittals. Contractor's responsibility for deviations in the submittals from requirements of the contract documents is also not relieved by the Engineer's review and acceptance of submittals unless the Engineer gives written acceptance of specific deviations. No work shall begin until submittals have been returned with the Engineer's stamp and initials indicating review.

Engineer shall review submittals within 10 days of receipt for design concepts and for conformance with information given in the contract documents and shall return four (4) sets of the submittal data to the contractor for distribution.

1.07 RECORD DRAWINGS:

Record drawings showing constructed conditions; dimensions, location and depth of all buried piping, location of concealed piping, plugged outlets, etc., shall be kept up to date. Master copies shall be maintained at the jobsite. The depth of sewers shall be from a permanent bench mark as shown on the contract drawings.

Provide one (1) set of drawings showing all "record" conditions to the Engineer upon completion of the project.

1.08 OPERATING AND MAINTENANCE BROCHURES:

At the end of the project, the contractor shall furnish to the General Contractor for the Owner, four (4) "Operating and Maintenance Brochures", including parts lists and operating instructions for all equipment furnished under this Division. Brochures are to be bound, indexed and clearly labeled on the cover, indicating the project name, date, and responsible authority.

1.09 CLEANUP:

Refuse and debris accumulating from work required under this division shall be regularly removed from the building site by the contractor and before final acceptance of his work

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by the Engineer or Owner. The premises shall be left broom-clean insofar as affected by the contractor's work.

1.10 PRODUCT DELIVERY, HANDLING AND STORING:

Provide equipment for unloading mechanical items and coordinate with General Contractor for satisfactory storage area.

Contractor shall use all means necessary to protect materials and equipment of this section before, during and after installation, and to protect work and materials of all other trades. Where possible, pipe and other materials subject to weather damage shall be stored inside. Where materials and equipment must be stored outside, such items shall be elevated well above grade and covered with a durable, waterproof wrapping.

All damaged materials shall be repaired or replaced as necessary. Repairs shall be subject to the approval of the Engineer and completed at no additional cost to the Owner.

PART 2 - PRODUCTS:

2.01 GENERAL:

All materials installed shall be new, full weight, domestic or foreign certifiable manufacture, of the best quality, of the brand or manufacturer used for each class of material or equipment. All requests for material or equipment substitutions shall be accompanied with complete catalog data indicating equal quality standards, performance characteristics, appearances, etc., to the materials and equipment specified. System designs are based upon equipment as listed in the Equipment Schedule. All changes in the connections, controls, starters, electrical equipment, space, openings and sound vibration isolation required by substituted material shall be made at no additional cost to the Owner.

2.02 MOTORS, STARTERS AND CONTROLS:

General: All motors, starters, disconnects and integral power and control wiring shall comply with NEMA Standards and shall be U.L. Listed and so labeled.

Motors: shall meet efficiency standards complying with EPACT NEMA MC1-12.6C. Motors, 10hp and larger, shall have 95% Power Factor, Corrected with Capacitors.

Motors shall be NEMA Standard Design of ample size to operate at their proper load at full speed and continuously without causing noise or vibration or temperature rise in excess of their rating.

Motors less than 1/2 HP shall be designed and nameplated for 115 volt, 1 phase, 60 Hz.

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operation and shall be open-drip proof type, rated at 40°C. continuous rise and equipped with ball bearings. Motors shall be designed for capacitor starting and with inherent thermal motor overload protection with reset.

Motors 1/2 HP and larger shall be designed and nameplated for 460 volt, 3 phase, 60 HZ. operation and shall be single speed, open-drip proof, squirrel cage, induction type NEMA Design "B", rated at 40°C. continuous rise and equipped with ball bearings.

Motor Starters & Disconnects: Furnished with the equipment to the manufacturer's standard specifications or by the Electrical Contractor in accordance with requirements specified in Division 26.

2.03 CONCRETE:

Concrete structures required for mechanical equipment installations, headwalls/endwalls, and equipment "housekeeping" pads shall be provided under this section of the specifications in accordance with requirements specified in Section 033000. "Housekeeping" pads shall be 3 5/8" high (nominal 2 x 4 stud form).

2.04 EQUIPMENT SUPPORTS:

Structural support steel for elevated or suspended mechanical equipment shall be designed as required to support weights involved with materials, fabrication and erection complying with minimum requirements for structural steel as specified in Section 055100. In all cases, supports shall be made with connections using "simple" framing.

2.05 EQUIPMENT GUARDS:

All mechanical power transmission apparatus shall be provided with guards in accordance with governing safety codes.

2.06 VIBRATION ISOLATION:

Resilient isolation pads for motors and equipment shall be as recommended by the manufacturer unless otherwise indicated. Isolators shall be equal to the following:

Floor-mounted, free standing spring isolators with 2" deflection; Mason, Type SLFH. This type isolator shall be employed under all equipment located on the metal deck and floor-mounted equipment subject to vibration.

Vertical isolation hangers shall be Mason, Type 30N. This type hanger shall be employed for isolation of all equipment suspended from the building structure.

2.07 BACKFILL MATERIALS:

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Refer to Section 31 2000 for Soil and Granular Backfill Requirements.

2.08 PIPING SPECIALTIES:

Dielectric Unions w/ Nipple: Provide at all connections between copper and ferrous pipe. Unions shall be Watts or approval equal. Dielectric Nipple shall be Legend or approved equal.

Pipe Escutcheons: Solid or split ring, chrome plated, stamped steel escutcheons, sized as required to fit over pipe and completely close the opening, Grinnell or equal.

Sleeves: Schedule 40 galvanized steel pipe or fabricated of 14 ga. galvanized steel sheets. Sleeves shall be provided where pipe passes through walls or floors and shall be sized to allow a minimum clearance between pipe and sleeve surface. Sleeves installed for piping subject to movement shall not restrict movement.

Fire Rated Wall Penetrations: Metacaulk 950 or equal firestopping sealant, UL rated, asbestos free. Install at all pipe penetrations in fire-rated walls.

2.09 HANGERS AND SUPPORTS:

General: Except as otherwise indicated, provide factory fabricated, piping hangers and supports, complying with ANSI B31.1 "Pressure Piping" and Manufacturer's Standardization Society (MSS) SP-58, "Hanger Materials Design and Manufacture". Piping systems shall be supported in accordance with provisions of SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems", and MSS SP-69, "Hanger Selection and Application" so as to maintain required pitch of lines, prevent vibration and provide for expansion and contraction. Fire protection pipe hangers shall be UL listed and FM approved and supported in accordance with NFPA guidelines.

Size of hangers and supports shall be selected to exactly fit pipe size for bare piping and to exactly fit around piping insulation with saddle or shield for insulated piping. Un-insulated copper pipe hangers and supports shall be copper.

Horizontal Pipe Hangers: Hangers for individual horizontal pipe runs shall be steel, adjustable clevis type, MSS Type 1, B-Line B3100, or equal.

Hanger rods shall be connected to the structure with steel "C" clamps with lock nut, B-Line B351L or equal, UL listed. Rods shall be fitted with a swivel turnbuckle, B-Line B3224 or equal, so that the hanger rods hang plumb. At contractor's option, hanger rods may be inserted through the space between bottom chord angles of bar joists and with the top of the rod fitted with B-Line B3248, or equal, washer plate to prevent the rod from pulling out. A swivel joint will be required for this hanging arrangement to ensure that the

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rods are plumb after installation.

Vertical Pipe Supports: Supports shall be split ring steel riser clamps, B-Line B3373 or equal, UL listed.

Insulation Protectors: All hangers supporting insulated pipe shall be provided with an insulation protector, B-Line B3151 or equal. Protector shall be fabricated of galvanized steel and contoured to the pipe/insulation diameter sized as in the following table:

<u>Pipe Size</u>	<u>Metal ga</u>	<u>Shield Length</u>
3" & smaller	18	12"
4"	16	12"
6"	16	18"

2.10 PIPE INSULATION:

General: All insulation materials, coating, adhesives, facing and auxiliaries shall have a Flame Spread Rating not over 25, a Smoke Developed Rating of 50 or less and a Fuel Contributed Rating of 50 or less. Rating to be determined in accordance with methods described in ASTM E84 "Test Method For Surface Burning Characteristics of Building Materials". Certification shall be provided that all insulation materials meet the minimum requirements of the applicable building code and the Flame Spread Smoke Development and Fuel Contribution Ratings previously specified.

Insulation thickness for specific applications shall be as specified in subsequent sections of this Division.

Pipe Insulation (Fiberglass): Sectional, heavy duty, fiberglass molded pipe insulation with factory applied vapor barrier jacket. Thermal conductivity of insulation shall be a maximum of .24 at 75°F. per inch of insulation thickness. Insulation jacket shall be an "All Service Jacket" composed of glass reinforced aluminum foil and white Kraft paper with a pressure sensitive adhesive closure strip. Outside aboveground and mechanical room insulation shall be provided with aluminum jacket in lieu of fire retardant FRJ jacket.

All straight runs of pipe insulation shall be tightly butted and joints vapor sealed with integral factory supplied self-sealing laps and end joint, pressure sensitive butt strips. Ends of insulation shall be sealed with white, fire-resistant vapor barrier mastic at all fittings.

Insulation shall be Certain-Teed "Snap-On", Owens Corning "SSL" or equal.

Flexible Unicellular Pipe Insulation: Flexible, electrometric, closed cell pipe insulation. Insulation shall be Armstrong "AP Armaflex" or equal complying with requirements of

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ASTM C534 "Preformed Flexible Elastomeric Cellular Thermal Insulation in Tubular Form".

Pipe Fitting Insulation (Fiberglass): Valves, fittings, and accessories shall be insulated with pre-molded PVC fitting covers with fiberglass inserts, Proto or equal, or with mitered segments of the specified pipe insulation. Fitting insulation shall be coated with two (2) 1/8" coats of glass cloth reinforced vapor barrier mastic with a 2" lap over adjacent pipe insulation or pre-molded plastic covers.

2.11 PAINT PRODUCTS:

PPG/Devoe Products establish the level of quality and performance required in accordance with requirements specified in Division 09.

2.12 PIPING IDENTIFICATION MARKERS:

Brady, Seton and equal, pre-printed pressure sensitive bands and markers of type hereinafter specified in Division 09.

PART 3 - EXECUTION:

3.01 GENERAL:

All materials and equipment shall be installed in a neat and workmanlike manner by competent specialists of the trade. Installation of equipment not meeting these standards shall be rejected by the Engineer and shall be removed and reinstalled by the contractor at no additional cost to the Owner. All materials shall be stored to prevent damage or weathering prior to installation.

3.02 CUTTING AND PATCHING:

Contractor shall carefully and accurately lay out his work, locating each and every pipe line and riser, and shall furnish wet sleeves where same pass through floor and wall construction while same is in process of erection.

All cutting and repairing must be done by the contractor at his own expense. Sleeves shall be fabricated of the specified materials and shall be the net thickness of floors or walls finishing flush with the surfaces.

3.03 PIPING:

General: Contractor shall generally conceal all pipe work in finished areas within pipe chases, furred ceilings, etc., unless otherwise noted on the drawings.

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Pipe work in unfinished areas shall be run parallel to, or at right angles to the building supporting structure and at heights that will permit maximum headroom. Contractor shall coordinate all piping with mechanical, electrical, fire protection and owner services to avoid interferences.

Piping passing through walls, floors or ceilings, shall have pipe sleeves and chrome plated escutcheons. Space between pipe and sleeve in exterior walls shall be filled with silicone or polyurethane sealant.

Piping shall be supported close to structural members with the previously specified hangers. Provide for expansion and contraction of all piping. No welding of hangers to building structural shall be permitted.

Piping hung in metal buildings shall be supported from the purlin mid point or a stiffener angle. No support from only the purlin lip shall be permitted.

Horizontal pipe hanging intervals: Hangers shall be placed at each offset or change in direction, at end of branches over 5' long and in long pipe runs as required by the following table:

<u>Pipe/Tube Size</u>	<u>Steel</u> <u>(W/Water)</u>	<u>Steel</u> <u>(Gas)</u>	<u>Copper</u> <u>Tubing</u>	<u>Hanger Rod</u> <u>Diameter</u>
3/4" to 1 1/4"	6'	8'	6'	3/8"
1 1/2"	9'	12'	6'	3/8"
2"	10'	13'	10'	3/8"
2 1/2"	10'	13'	10'	1/2"
3"	10'	15'	10'	1/2"

Support PVC piping at 4' intervals.

Vertical Pipe Hanging Intervals: Vertical runs of piping shall be supported at not less than 10' intervals to ensure minimum sway.

Multiple Pipe Hangers: Horizontal, parallel and adjacent piping shall be supported by trapeze type hangers using Unistrut Series 4000 or equal, with nuts, hanger rods and necessary clamps. Clamps shall be sized to fit over insulation.

Hanger Rod Locations: When hanger rods are supported from the bottom or top of a bar joist, the rod should be installed within 3" of the panel point (point where bar connects to bottom chord) or the joist must be reinforced from the bottom chord to the top chord at the point where the hanger rod is installed. This requirement applies to all rods supporting trapeze hangers and rods supporting individual pipes larger than 3". Refer to Structural Drawings for Reinforcement Details.

SECTION 23 0500; BASIC MATERIALS AND METHODS

Underground pipe shall bear uniformly on the trench bedding throughout the full length of the pipe. Pipe in trenches shall be cleaned inside when placed and open ends shall be plugged when work is stopped to prevent stones or other foreign materials from entering such pipe.

Overhead piping shall be installed to be free from stress and distortion by expansion and contraction. Anchors, expansion loops, and offsets shall meet with acceptable practices. Anchors shall be securely attached to building structure.

Pack space between fire rated wall sleeves and pipe with fire retardant material provided with sleeve.

Pipe Joints: The ends of all field fabricated pipes shall be carefully reamed to inside diameter of pipe and shall be free from burrs, slivers, damaged threads, dirt or other foreign matter that would disturb fluid flow or prevent the making of a tight joint.

Gasketed Joints in cast iron soil pipe and cast iron pressure pipe shall be made in accordance with pipe manufacturer's recommendations.

No-Hub cast iron pipe and fittings shall be installed in accordance with C.I. Institute Standard #100.

Welded pipe joints shall be in accordance with procedure metallic arc welding of steel pipe, fittings and flanges as outlined in ANSI B31.1. All offsets or bends shall be made with butt weld fittings. Connection to mains shall be made with Schedule 40 welding fittings.

PVC pipe joints shall be solvent cemented in socket type fittings in accordance with fitting manufacturer's recommendations and in accordance with requirements of ASTM D2665 and D2855.

Screwed joints shall be made up with teflon tape or other lubricant suitable for the service conditions and which will not react unfavorably either with the service fluid or the piping materials. Backing off to permit alignment of pipe threaded joints shall not be permitted.

Soldered joints in copper tubing shall be made up utilizing solder of 95-5 composition with flux.

Flanged joints shall be fitted up so that the gasket contact faces bear uniformly on the gasket and then shall be made up with relatively uniform bolt stress. In bolted gasketed flanged joints, the gasket shall be properly compressed in accordance with the design principles applicable to the type of gasket used. All bolts shall be

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engaged so that there is visible evidence of complete threading through the nut or threaded attachment.

Grooved piping joints shall use optimum gasket/lubricant for the specific service and comply with manufacturer recommendations, Victaulic or equal.

Pipe Cleaning: Interior surfaces of pipe required to be installed under this Division shall be cleaned immediately before erection and shall be maintained in clean condition during erection. Cleaning methods shall be as required to remove oil, grease, rust, scale, mud or other foreign material. Proposed methods of cleaning shall be submitted to the Engineer for approval. All detergents, solvents, and other cleaning agents shall be compatible with materials of fabrication, the process stream to be handled by the piping system, and be environmentally safe.

3.04 EXCAVATION AND BACKFILLING:

Refer to Section 31 2000 for pipe trench requirements.

Contractor shall locate and protect existing utilities and other underground work in a manner that will ensure that no damage or service interruption will result from excavating and backfilling. Contractor shall further protect property from damage, which might result from excavating and backfilling.

Contractor shall make adequate provisions for the protection of personnel from injury at excavations by the use of barricades, warnings and illumination.

Contractor shall maintain trenches in a dry condition by removing water and shall protect excavations from inflow of surface water by means of satiable berms or other damming techniques.

3.05 PIPE INSULATION:

Fiberglass Insulation:

Sectional insulation shall be applied to the pipe and shall be continuous through all hangers and sleeves. All joints shall be tightly butted. Longitudinal self-sealing laps shall be sealed in accordance with the manufacturer's recommendations.

Ends of insulation shall be sealed with white, fire resistant vapor barrier mastic at all fittings and between insulation sections.

Fitting and valve insulation shall be equal in thickness to the pipe insulation and shall consist of molded fiberglass fittings, mitered segments of pipe covering or compressed fiberglass blankets. Pipe sizes under 4" may be insulated with hydraulic setting insulating

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cement. Fitting insulation shall be held in place with wire ties and a smoothing coat of insulating cement shall be applied over the fitting surface and wire ties or plastic covers with molded fittings. A uniform coat of fire retardant vapor barrier mastic, reinforced with glass cloth shall be applied over the fitting surface. Coating shall extend 2" onto adjacent pipe covering.

Flexible Unicellular Insulation: Apply in accordance with manufacturer's recommendations. Tubing shall be slipped onto piping before installation or slit lengthwise and fitted around pipe with end and longitudinal joints self sealed or sealed with approved adhesive, Armstrong 520 or equal.

3.06 PAINTING:

All weather exposed ferrous pipe (gas piping at service entrance and on roof, regulator vents, etc.) shall be field painted with a minimum of two (2) coats of enamel paint. Painting materials and application methods shall comply with requirements of Division 09.

All equipment frame structural steel shall be painted with one coat of alkyd primer, gray in sufficient quantity to provide a uniform dry film thickness of 2 mils.

3.07 PIPING IDENTIFICATION:

Exposed piping shall be color labeled with contents and flow direction after piping has been installed and painted (as required). Labels and application shall comply with requirements of Division 09 included on the following piping services:

Domestic Cold Water
Domestic Hot Water
Condensate

3.08 TESTS AND INSPECTIONS:

Contractor shall make all tests necessary to establish adequacy, quality, safety, completed status and satisfactory operation of each system and its components. Systems shall be free of electrical grounds and short circuits.

All labor and material required to make such tests shall be provided by the contractor.

Disconnect equipment as necessary to prevent damage to internal components, which might occur during testing. Review manufacturer's installation instructions as necessary.

Specific testing requirements shall be as outlined in subsequent sections of this Division. Test results should be forwarded to Owner.

DIVISION 23 HVAC

SECTION 23 0600

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

Work included under this Section of the Specifications shall consist of furnishing of all labor, materials, tools, equipment and supplies required to complete heating, ventilating and air conditioning work as shown on the drawings and as hereinafter described. Work shall include the following major systems:

Supply and installation of heating and exhaust systems for the bathroom areas. Systems shall include roof-mounted exhaust fans, sheet metal ductwork, exhaust registers and ceiling mounted electric heaters.

Supply and installation of air conditioning systems for the Processing Area. Systems shall include floor mounted ATO (air turn-over) units with electric cooling with remote pad mounted air cooled condensing units and temperature controls.

Supply and installation of building energy management system including a control module in each ATO and lighting contactor panel.

Applicable provisions of General Conditions and Division 1 of the Technical Specifications are included in the scope of this section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

Basic Materials and Methods: Section 23 0500

Air Distribution: Section 23 3300

Installation of Remote Motor Starters and Disconnect Switches: Division 26

Power and Control Wiring of HVAC Equipment; Division 26

Supply and Wiring of Fire Protection Devices in HVAC Units: Division 26

1.03 MECHANICAL GENERAL PROVISIONS:

Comply with requirements of Section 23 0500, Part 1 and the following special provisions:

HVAC equipment shall be U.L. Labeled in accordance with requirements of

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governing State regulations.

HVAC systems shall comply with requirements of NFPA Standard 90A, "Installation of Air Conditioning & Ventilating Systems" and NFPA Standard 101 "Life Safety Code".

HVAC systems shall be tested and balanced to comply with recommendations of SMACNA "HVAC Systems - Testing, Adjusting & Balancing".

HVAC equipment and systems shall comply with applicable ASHRAE & ARI Standards.

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with requirements specified in Section 23 0500.

2.02 VENTILATION FANS:

Ventilation fans shall be furnished and installed at locations and with performance requirements as shown on the drawings. Fans shall bear AMCA Certified Rating Seal for air and sound performance.

Motors operating on 115 volt/1 phase shall have built-in overloads. Unit mounted disconnect switch to be mounted to allow servicing of motor and drive.

Bearings shall be selected for a minimum average (L10) life in excess of 100,000 hours (10% maximum failure in 100,000 hours) at maximum operating speed.

Roof curbs with damper tray (as required) shall be furnished by the fan manufacturer. Curbs shall be fabricated of 18 ga. steel or aluminum for sizes to 30" and 16 ga. for larger fan sizes and shall be straight without cant. Curb height to be 14" minimum. Steel curbs to be furnished with galvanized or baked enamel finish. Provide treated wood nailing strips.

Furnish fans of following types as scheduled on drawings.

Centrifugal - Roof-Mounted: Greenheck or equal, Model GB, belt drive, or Model G direct drive, centrifugal type. Model G fans shall include solid state controller.

Ventilator housings shall be of heavy gauge aluminum mounted on a rigid support. Motor shall be mounted on vibration isolators and shall be completely sealed from exhausted air. Fan wheel shall be aluminum backward curved and be dynamically

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and statically balanced. Exhaust fans shall be equipped with a self-acting, counterbalanced backdraft damper and birdscreen.

Provide thermostat for operation of fans as shown on the drawing schedule.

2.03 AIR TURNOVER UNIT (ATO) AND DX SPLIT SYSTEM HVAC UNIT:

MJC ATO Series, or equal, floor-mounted, cooling only.

DX cooling coil with copper tubes and aluminum fins and stainless steel drain pan. Remote mounted condensing unit and controls required.

Blower assembly constructed with structural steel frame, direct drive with VFD. Tested in accordance with AMCA Standards.

Casing with double wall (foam filled) galvanized steel panels/enamel finish with aluminum tubular framework. Air cooled internal galvanized steel radiation shields and double wall insulated construction to maintain low jacket loss. Discharge and intake provided with low velocity plenum with 3-sided inlet discharge (or single direction as indicated). Plenum heights as suggested by manufacturer to provide air circulation with minimum space temperature difference between floor and ceiling of DC areas. Provide flat-bank filter section with two sets of filters.

Controls mounted in dead front cabinet including main disconnect switch, magnetic motor starter with three overloads, switching relays, fuse blocks with factory mounted fuses, terminal strips, burner service and fan toggle switches, powered convenience receptacle from line side of disconnect. Disconnect and receptacle located at 4'-0" AFF. Power transformer to supply control voltage. Factory mounted temperature control system, consisting of return air ductstats.

Provide smoke detector located in supply casing. Unit to be factory tested to assure performance.

2.04 REFRIGERANT PIPING SYSTEMS:

Split System Piping: Type "L" hard drawn copper tube and fittings, complying with ASTM B88 and with wrought copper, solder-joint fittings complying with ANSI B16.22. Solder shall be Harris "Silfos" or equal, 15% silver.

Pipe and Fitting Insulation: 3/4" thick flexible unicellular insulation on suction line, complying with Section 23 0500. All exterior piping to have aluminum jacketing.

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Filter/Dryer and Moisture Indicators: Install in liquid line. Size to be as indicated by equipment manufacturer.

Suction Accumulator: Install in suction line to prevent liquid slugging of condensing unit compressor. Size to be as indicated by equipment manufacturer.

2.05 SPLIT SYSTEM CONDENSING UNITS (AIR TURNOVER UNITS):

Trane RAUCD, or equal, air cooled condensing units of the type, size and capacity shown on the drawing schedule.

- a. Condenser Coil: Nonferrous construction with aluminum plate fins, mechanically bonded to seamless copper tubes. Coil shall be circuited for subcooling.
- b. Condenser Fans and Motors: Direct-driven, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have inherent protection and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard. Controls shall be included for cycling or adjusting speed of fans for intermediate season operation.
- a. Compressor: Scroll design with crankcase heater. Compressor shall be located in a section separated from condenser fans and coil.
- b. Controls: Factory wired and located in a separate enclosure. Safety devices shall consist of thermal and current sensitive compressor overload devices. Unit wiring shall incorporate a positive acting timer to prevent short cycling of compressor if power is interrupted. Indoor thermostat shall be provided for control from the conditioned space.
- e. Casing shall make unit fully weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel. Openings shall be provided for power and refrigerant connections. Panel shall be removable to provide access for servicing.

2.06 BUILDING MANAGEMENT SYSTEM (BMS):

Design and supply control system by NexRev for ATO/CUs, HVLS fans and connection to electrical lighting control panels, including control sequence drawings and wiring diagrams as required. Guarantee within one (1) year acceptance to replace or repair at no cost to Owner, any defects in materials and workmanship under normal use and service.

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Provide web-based system, coordinated with existing system, for monitoring, main control panel/related hardware; low voltage cables, relays, sensors, and overrides, and 24 volt terminations to equipment.

FACILITY AREAS HVAC:

The ATO unit is scheduled through the BMS system. The unit is started optimally up to two hours (adjustable) in advance to achieve the space temperature setpoint by the scheduled time. The start-up cooling and heating rates are automatically adjusted from historical data and outside conditions. The outside air damper is closed during the start-up period.

Occupied Mode: The HVAC unit will operate in the occupied mode when scheduled or by activation of a timed override button at the respective space temperature sensor. The time override period is operator set. The supply fan is started and supplies a constant volume of air. Fan status is monitored by an air flow differential pressure switch.

Cooling: The compressor(s) are cycled in the cooling mode to maintain the space setpoint of 78°F (adj) as set from the space sensor. Automatic lead/lag rotation of the compressors is enforced.

A dirty filter alarm is indicated at the DDC system display when the pressure drop across the filters has exceeded the setpoint.

The smoke detectors located in the supply/return ducts are hard wired to shut down the fan upon sensing products of combustion.

Unoccupied Mode:

Cooling: The fan is started when the space temperature has risen above the unoccupied cooling setpoint of 10°F higher than occupies design temperature (adj.) as set by the operator. The OSA damper remains closed and the compressors are staged on to maintain 5°F (adj.) below the unoccupied cooling setpoint at which time the unit is turned off.

PART 3 - EXECUTION:

3.01 GENERAL: Comply with requirements specified in Section 23 0500.

3.02 EQUIPMENT:

All equipment shall be installed in accordance with the manufacturer's recommendations. Equipment shall be arranged and fitted into the available space so that components are accessible for service and repair.

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Locate thermostats 4' above floor (eye level) or as noted on drawings.

Rooftop exhaust fans shall be set on the specified prefabricated curbs. These fans shall be accurately leveled and aligned to ensure proper performance. Assure lag screws are provided in all mounting holes on the curb cap.

All fans and motor bearings shall be lubricated in accordance with the manufacturer's instructions. "V" belts shall be adjusted for minimum belt slippage. All bearings shall be left in a satisfactory, cool operating condition.

Install filters provided with equipment before unit placed in operation. All filters shall be cleaned or replaced at time of air balance (U.L. Class 1). U.L. Class 2 filters shall be installed in the unit for initial operation.

Heaters should not be subjected to test pressures while checking piping for leaks.

Verify split system refrigerant line sizes with equipment manufacturer. Circulate nitrogen through system during joining process to minimize flaking or replace filter/dryer after 48 hours of system operation to remove trapped flaked material.

Verify functional test of fire/smoke dampers is performed and submit certification (dated, signed, witnessed to engineer/municipal authorities).

Start-up: Conduct start-up per manufacturer "Installation, Start-up, and Service Instructions" provided with each piece of equipment. Assure all operating sequences are checked.

3.03 ENERGY MANAGEMENT SYSTEM:

BMS contractor to provide supervision of installation, adjustment and calibration of the energy management system. Place system in complete operating condition and instruct Owner in sequence, maintenance and operation of controls.

3.04 FIRE PROTECTION:

Coordinate with Electrical Division 26 for firestat installation in HVAC units. Firestats required in supply and discharge. Refer to Division 26 when there is fire alarm system.

3.05 CUTTING AND PATCHING: Comply with requirements of 23 0500.

3.06 TESTING AND BALANCING:

Contractor shall be responsible for all testing, air and water distribution system balancing,

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and adjusting of all equipment and controls specified under this section.

Contractor shall obtain services of certified, independent testing and balancing firm, approved by the Owner, for all testing and air distribution system balancing, and adjusting of all equipment and controls specified under this section. Submit AABC or NEBB National Project Performance Guaranty to Owner prior to balancing work.

Submit detailed narrative of procedures for each air system including instruments to be used; working agenda; forms and data sheet samples; and description of measurements, test locations, and procedures to be employed during test and balance.

Air distribution system balancing shall be performed by adjusting each supply/return/exhaust air register or diffuser to deliver design quantities indicated on drawings. Balancing shall be performed in conformity with latest standards of the Associated Air Balance Council (AABC) and SMACNA "HVAC Systems - Testing, Adjusting, and Balancing" recommendations including the following sequence:

Ascertain that all dampers and volume control are open in constant volume systems (excepting dampers which change the percentage of outside air; in which case, the minimum outside air damper should be open and the maximum outside air damper and relief-air damper closed).

Ascertain filters are clean.

Set fan to obtain the required CFM.

Set all exhaust dampers to obtain the required CFM.

Check all airflows (supply, return and outside air), and readjust system as many times as required to come within 10% of the design requirements for each inlet or outlet for the design.

For balancing a variable volume system, set each box to the full condition and adjust the diffusers for the design condition. The box should then be returned to the normal set point. This procedure should begin at the box closest to the fan and be repeated at each box working away from the fan.

A report on SMACNA Tab Report Forms with four copies shall be furnished to the Engineer immediately on completion of the balancing operation. This report shall include the following information for each air handling unit.

Fan motor voltage and amperage ratings and readings.

Fan rpm's.

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Fan discharge and suction static pressure readings.

Duct cooling/heating coil or furnace static pressure reading, upstream and downstream.

Cooling/heating leaving air temperature.

Ambient air temperature.

Supply/return/outside air total volume.

CFM at each supply, return, and exhaust grille and/or register.

Average velocity reading at each supply grille and/or diffuser, and at each exhaust and return register and/or grille.

Refrigerant piping shall first be tested for leaks with dry nitrogen or carbon dioxide and liquid soap suds solution with a system pressure of 300 psig on high side and 200 psig on low side. Open system and allow nitrogen or carbon dioxide to escape while repairing any leak found. System shall then be partly evacuated to 20" vacuum and next charged with refrigerant until 15 psig is reached and again tested for leaks using Halide Leak Detector or halide torch. System shall be thoroughly dehydrated using vacuum pump. Evacuate system to 0.2 Hg absolute and then break system, stop pump, and allow system to stand for at least 12 hours. If no noticeable rise in pressure is noted after 12 hours, system may be charged. A clean filter/dryer must be used in charging line during refrigerant charging. Any additional precautions that compressor manufacturer may require to make compressor warranty valid shall be considered part of these specifications. Procedure may be modified by use of precharged refrigerant piping.

DIVISION 23 - HVAC

SECTION 23 3300

AIR DISTRIBUTION

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

The scope of work included under this Section of the Specifications consists of furnishing of all labor, materials, tools, equipment and supplies required to complete the air distribution work as shown on the drawings and as hereinafter described. Work elements included under this section of the specifications include the following:

Supply and installation of round and rectangular galvanized ductwork for the restroom exhaust system to the extent shown on the drawings.

Supply and installation of all ductwork accessories, including turning vanes, spin-in fittings, balancing dampers, flexible connections, return air and exhaust grilles/registers, supply diffusers, etc. in the office and warehouse HVAC distribution systems.

Applicable provisions of the General Conditions and Division 1 of the Technical Specifications are included in the scope of this Section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

Basic Materials and Methods; Section 23 0500

Heating, Ventilating and Air Conditioning; Section 23 0600

1.03 MECHANICAL GENERAL PROVISIONS:

Comply with requirements specified in Section 23 0500 as applicable and the following special provisions.

Sheet metal ductwork shall be fabricated and installed in accordance with referenced Plate Numbers of the SMACNA "HVAC Duct Construction Standards".

Sheet metal ductwork shall comply with requirements of NFPA Standard 90.

Sheet metal ductwork shall be fabricated and installed in accordance with requirements of applicable ASHRAE Standards.

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with requirements specified in Section 23 0500.

Duct dimensions shown on drawings are inside clear dimensions.

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Figures and tables referenced throughout this Section are the SMACNA "HVAC Duct Construction Standards".

2.02 ROUND DUCTWORK:

Round exhaust ductwork shall be spiral seam duct. Duct shall be galvanized steel with spiral lock seams. Thickness shall be 24 ga. Semco Manufacturing or equal.

2.03 SPIN-IN FITTINGS:

Wiremold Twist-Ez 370 Series or equal, fitting with insulation guard, outside air seal ring/flange and damper with locking arm. Galvanized 26 gauge steel construction.

2.04 DUCT ACCESS DOORS:

Access doors shall be provided for fire protection accessories and at any other location shown on the drawings. Doors shall be constructed of double wall galvanized steel with internal fiberglass insulation, galvanized hinges, locking device, and gasketed edges in accordance with Figures 2-10 and 2-11.

2.05 DAMPERS:

Balancing dampers in supply, return, exhaust and outside air ducts shall be fabricated in accordance with Figures 2-12 & 2-13. They shall be multiple opposed blade or parallel blade design and unless otherwise noted, shall be arranged for manual operation. When the width of the duct is less than 12", a single blade "splitter" damper with quadrant device to indicate position of damper shall be provided.

Dampers shall be constructed in sturdy steel channel frames with 20 ga., single blade or 16 ga. multi-blade galvanized steel, die formed blades, 1/2" diameter or greater steel pivot shafts and brass sleeve type bearings at each end of pivot bar. The maximum blade width shall not exceed 12". Dampers in outside air ducts shall be of galvanized steel construction, including blades and frames, and shall be provided with stainless steel shafts and trunnions.

2.06 FLEXIBLE CONNECTIONS:

Flexible connections shall be provided between all fan housings and ducts to which they are connected in accordance with Figure 2-19. Rooftop HVAC units with manufacturer flex connection between fan & cabinet do not require this. These connections shall be glass fabric, double coated neoprene as manufactured by Ventglass, Standard or Metaledge. Material shall be flame retardant fabric with flame spread rating of 25 or less and smoke developed rating not higher than 50.

2.07 RETURN AIR, TRANSFER AND EXHAUST GRILLES/REGISTERS:

Captioned grilles shall be square, perforated face type, suitable for lay-in acoustical ceiling mounting. Grilles shall be of steel construction with aluminum perforated face and furnished with a baked white enamel finish. Exhaust registers shall be fitted with volume

SECTION 23 3300; AIR DISTRIBUTION

control dampers. Grilles shall be Price APDDR, or equal. Grilles shall be furnished with square or round necks, as required by the ductwork connections.

PART 3 - EXECUTION:

3.01 DUCTWORK:

Ductwork assemblies, including all fittings, turning vanes, dampers, etc., shall be installed as required by the drawings. All ductwork shall be accurately leveled and run parallel to or at right angles to the structure.

Hanger sizes for rectangular ductwork shall be in accordance with Table 4-1, but with minimum sizes tabulated below:

<u>Strap Hangers</u>	<u>Trapeze Hangers</u>
1" x 20 ga.	1" x 1" x 1/8"

Hangers for rectangular ductwork shall be spaced at intervals not exceeding 10'.

Upper and lower attachment devices for hangers shall be in accordance with Figures 4-1 thru 4-4. Upper attachment devices shall not be welded to building structural unless otherwise shown on drawings.

Hangers for round ductwork shall be 1" x 20 ga. straps minimum in accordance with Table 4-2. Hangers shall be spaced at intervals not exceeding 12'.

Flexible round duct shall be limited to 8' length. Hangers shall be 1" x 20 ga. straps with installation in accordance with Figures 3-9 and 3-10. Collars and sleeves shall be a minimum of 2" length and inserted into flexible duct a minimum of 1" before fastening using a stainless steel clamp (Flexmaster LS series or equal) or draw band (Panduit SLT 10 with STHV installation tool or equal). Ends of ducts shall be trimmed squarely prior to installation. Ducts shall not be compressed and bends shall be not less than duct diameter centerline radius.

Duct construction and installation shall meet SMACNA Seal Class C (ductwork downstream of VAV boxes) which requires sealing for traverse joints and Seal Class B (VAV systems between HVAC units and VAV boxes) which requires sealing for traverse joints and longitudinal seams. Sealing shall be with tape systems, adhesives, gaskets, or combinations of these methods, 3M Company EC800 or equal.

Ducts passing through floors/walls shall have clearance space closed (using angles attached to duct) to cut off draft.

Install flexible connectors to allow 4"-8" between equipment housing and duct. Unit shall be attached to the rooftop unit roof curb, not to the unit.

Paint ductwork which is visible through grilles and registers with a coat of flat black. Assure conduit, etc. above the ceiling is not visible through grilles.

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Provide access openings, as required, for inspection and servicing fire protection accessories, etc. Provide cleanout openings in plenums and horizontal ducts at approximately 20' intervals. Removable registers/grills are acceptable.

3.02 DUCTWORK ACCESSORIES:

Dampers, diffusers, grilles, etc., shall be installed in accordance with the manufacturer's printed instructions.

Damper operators shall be located so that they are readily accessible for adjustment. Coordinate with electrical contractor for wiring of actuator.

3.03 EQUIPMENT

All equipment shall be installed in accordance with the manufacturer's recommendations.

SECTION 26 0500
BASIC MATERIALS AND METHODS

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

- A. Work included under this section shall consist of furnishing of all labor, materials, tools, equipment and supplies required to complete installation of conduit and wiring systems, boxes, motor starters, safety switches, and miscellaneous devices to the extent shown on the drawings. Work shall include but is not necessarily limited to the following major systems:
1. Supply and installation of convenience outlet receptacles, with all required boxes, conduit raceway systems and branch circuit conductors.
 2. Supply and installation of lighting system light and motion sensor switches, power packs, control relays, conduit raceway systems with all required fixture outlet and switch boxes and branch circuit conductors. This work to include all required conduit systems, photocells for light harvesting in the process and hotel areas. This to include control equipment and interconnecting wiring systems.
 3. Supply and installation of conduit raceway system, boxes and branch circuit conductors for heating and air conditioning units. Safety disconnect switches and maintenance receptacles to be furnished with the rooftop unit equipment.
 4. Supply and installation of conduit raceway system, boxes and branch circuit conductors for HVLS fans.
 5. Supply and installation of non fused disconnect switch, conduit raceway system, boxes and branch circuit conductors for trash compactor units. This work shall include installation of control station and control wiring between control station and hydraulic pump unit.
 6. Supply and installation of non fused disconnect switch conduit raceway system, boxes and branch circuit conductors for facility area baler units.
 7. Supply and installation of conduit raceway systems, boxes, and branch circuit conductors for domestic water heaters. This work shall include supply and installation of local disconnect switch.
 8. Supply and installation of non fused disconnect switch, conduit raceway systems, boxes and branch circuit conductors for power and control wiring of motor operated overhead doors. This work to include installation of P.B. control station. Control station to be supplied with doors.
 9. Supply and installation of receptacles, conduit raceway system, boxes and branch circuit conductors for vending machines.
 10. Supply and installation of conduit raceway systems, boxes and branch circuit conductors for air compressors and related equipment.
 11. Supply installation of conduit raceway systems, boxes and branch circuit conductors for air bag leveler equipment. This work to include connection of dock locks, safety lights, and twin arm trailer lights.
 12. Supply and installation of conduit raceway systems, boxes, and branch circuit conductors for ventilation fans located at each truck dock. This work to include 30A3P toggle switch at each fan location.
 13. Supply and installation of empty flush two gang boxes with empty 3/4" conduit stubbed into ceiling space for voice/data cables.
 14. Supply and installation of conduit raceway systems, boxes, branch circuit conductors and relay for restrooms and locker room area exhaust fans. Fan control to be as called for by the plans.
 15. Supply and installation of conduit raceway systems, boxes and branch circuit conductors for power to fire alarm system power supplies.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

- A. General Conditions of the contract.

- B. Applicable requirements of Division 011000 of the Technical Specifications apply to the work specified in this section.
- C. Supply and installation of heating-ventilating and air conditioning equipment and water heating equipment: Division 230000.

1.03 CODES AND STANDARDS:

- A. The contractor shall consult with the various public and other authorities having jurisdiction and shall install his work to comply with all laws applying to electrical installations which are in effect in the City, County and State, and further in accordance with the latest regulations of the National Board of Fire Underwriters. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of the governing codes.
 - 1. In addition to the governing codes, all work required under this section of the specifications shall be performed in accordance with applicable provisions of the following Industry Standards:
 - 2. The Standards of the Institute of Electrical and Electronic Engineers (IEEE).
 - 3. The Standards of the Underwriters' Laboratories. (UL)
 - 4. The National Fire Protection Association (NFPA), "National Electrical Code", NFPA #70 (N.E.C) latest adopted edition.
 - 5. National Electrical Manufacturer's Association Standards (NEMA).
 - 6. The Insulated Power Cable Engineer's Association Standards (IPCEA).
 - 7. The American Society for Testing Materials (ASTM).
 - 8. The National Bureau of Standards.
 - 9. The National Electrical Safety Code.
 - 10. The American National Standards Institute (ANSI).
 - 11. The International Building Code (IBC) latest adopted edition.

1.04 COORDINATION AND COOPERATION:

- A. The contractor shall coordinate his work with the work of other contractors involved in this construction project and with the local utility company. The contractor shall arrange and schedule his work so that there will be no delay in the installation and/or completion of any part or parts of his system. The electrical work shall be installed in proper sequence with other trades, whose work may be affected by his installation.
- B. Before proceeding with the work, the contractor shall examine all the construction drawings of all disciplines and the drawings of the other contractors (any installation drawings) and he shall consult with the representatives of these other contractors so as to avoid work interferences.
- C. Wherever interference might occur, the contractor shall consult with other contractors before installation of any of the work in question and shall reach an agreement with them regarding the location and elevation of his equipment, materials and apparatus. Should the contractor fail to comply with this provision, he will be required to rearrange any work causing interference with the other contractors.
- D. The contractor shall also consult with other contractors to ensure that any electrically operated equipment supplied conforms with requirements of the building electrical system. If equipment does not conform to the electrical drawings with respect to voltage, phase and ampere loads are concerned, the contractor shall notify the Engineer in writing before any conduit rough-in or conductors are installed.

1.05 PROTECTION OF THE WORK:

- A. The contractor shall adequately protect his construction materials and installed work at all times during the progress of construction so as to prevent damage to same. Replacement and/or repairs to such materials and workmanship, arising from failure of the contractor to provide adequate protection, shall be made at the contractor's expense. The contractor shall further use reasonable precaution to prevent damage to adjacent and/or related construction provided by others and he shall be responsible for damage to such other construction resulting from his negligence.

1.06 CLEANUP:

- A. The contractor shall maintain the premises free at all times from waste or surplus materials created by his work. In addition, the contractor shall perform the following cleaning activities.
 - 1. Remove stickers, rust stains, labels, temporary covers, etc., after all equipment, fixtures and other units of the building system have been installed.
 - 2. Flush or blow out all foreign matter in all raceways, cabinets, boxes, motors, devices, switches, fixtures, and all other similar equipment and materials.
 - 3. Remove all excess paint and polish all equipment nameplates and identification plates.
 - 4. Dust and clean completely the exterior and interior of switchboards, motor control centers, distribution panels and branch circuit panelboards.
 - 5. Leave the finished system and installation in a safe and clean condition, ready for operation.

1.07 ADJUSTING AND TESTING:

- A. Contractor, upon completion of the work, shall thoroughly test all equipment and appurtenances furnished and wired by him and make all necessary adjustments to devices. He shall assist other contractors in testing all equipment furnished to him by these contractors and subsequently installed and wired by him. He shall leave all his work in first class condition before requesting final inspection.
- B. Contractor shall arrange circuit connections to panelboards so that all lights, motors and resistive heaters shall balance the three phases of the system as closely as possible. All phases of the system shall be balanced within 5%.
- C. After completion of the work, the contractor shall demonstrate that all installations are complete and in perfect operating order with raceways properly grounded. All circuits shall be completely tested to determine existence of grounds and short circuits, using a Megger Tester with all switches in the CLOSED position. Further, he shall demonstrate that all systems operate full in accordance with the intent of the drawings and specifications.
- D. Provide copies of all test logs for all cables, both feeder and branch circuit, in a binder to the owner and engineer.

1.08 SUBMITTALS:

- A. Within 30 days after award of the contract, 8 copies of the complete material lists of all proposed materials, bound in 3 ring binder notebooks, shall be submitted to the Engineer for review and approval. Contractor shall include with the submittal list sufficient catalogs or other data describing all proposed materials required for a complete electrical system installation. Submittals to be complete. No partial sets.

1.09 MAINTENANCE AND OPERATING INSTRUCTIONS:

- A. The contractor shall provide the services of an instructor, approved by the Engineer, to instruct the Owner, his agent or representative in the correct operating procedure for the electrical system. The contractor shall furnish to the General Contractor for the Owner's use, 3 complete sets of the following data for each piece of electrical equipment furnished by him:
 - 1. "Manufacturer's Service Parts List".
 - 2. "Manufacturer's Operating Manual".
 - 3. "Equipment Service Requirements".
 - 4. "Wiring Diagrams".
- B. The above manuals shall be submitted to the Engineer for approval. All required literature shall be bound in a 3 ring binder note book.

1.10 GUARANTEE:

- A. All materials and workmanship shall be guaranteed free from defects for a period of one year from date of acceptance of the work except lamps, which shall be as follows:
 - 1. Fixtures requiring standard incandescent lamps shall be provided with one lamp.
 - 2. Fluorescent lamps shall all be operational at the time of acceptance of the work. Any defective lamp at that time shall be replaced.

3. High Intensity Discharge (HID) lamps shall all be operational at the time of acceptance of the work. Any defective lamps that appear after acceptance of the work and within 25% of the manufacturer's average rated life, a replacement shall be provided to the Owner.
- B. The contractor, when notified in writing by the Engineer or Owner, shall promptly remedy any defects, which develop within the guarantee period, without cost to the Owner.

PART 2 - PRODUCTS:

2.01 GENERAL:

- A. All materials and equipment shall be new, free from defects, of first quality, of recognized manufacture and entirely suitable for the intended service. All materials and equipment shall be of type and with minimum quality and performance standards described herein or indicated on the drawings.

2.02 SAFETY SWITCHES:

- A. Safety switches shall be Eaton heavy-duty, fusible or non fusible, single throw, quick-make, quick-break, 2, 3, or 4 pole, 600 volt as shown on the drawings.
- B. General purpose safety switches within the building shall be in NEMA, Type I enclosures.
- C. Safety switches located outside the building shall be housed in raintight enclosures, NEMA, Type III R.
- D. Contractor shall furnish all appropriate size fuses where fused safety switches are required. This work to include furnishing and installing fuses for bus plugs.

2.03 FUSES:

- A. Contractor shall provide all fuses required for this project, or as required by appropriate provisions of the National Electric Code. Fuses shall be as manufactured by the Bussman Corporation or an approved equal. Fuse sizes and types shall be called for by the drawings.

2.04 CONDUIT RACEWAYS:

- A. Rigid steel conduit and conduit elbows shall be heavy-wall, galvanized, standard weight, mild steel tubing, bearing the U.L. Label and showing the manufacturer's name and trade mark.
- B. Intermediate Metal Conduit (IMC) and conduit elbows shall be galvanized, standard weight, mild steel tubing, bearing the U.L. Label and showing the manufacturer's name and trade mark and the letters "IMC" AT 2.5' intervals.
- C. Electric metallic tubing shall be fabricated of mild steel tube, provided with a zinc coating and in special applications, with a plastic coating. This tubing shall bear the U.L. Label and shall show the manufacturer's name and trade mark.
- D. Flexible metallic conduit shall be used to complete the connections to normally stationary motors, limit switches, other externally mounted devices, connections between rigid conduit and units having small or infrequent movement and connections to recessed or semi-recessed lighting fixtures. This conduit shall be standard metallic flexible conduit, as manufactured by "Greenfield" or an approved equal. Where moisture conditions are present, this conduit shall be liquid-tight, "Sealtight" or an approved equal. The maximum length of flexible metallic tubing shall be 6'.
- E. Conduit shall be equal to the product as manufactured by Republic Steel.
- F. Rigid polyvinyl chloride (PVC) conduit shall be high impact, heavy-duty type (Sch-40 or Sch-80), as called for by the plans and manufactured by Carlon Company or an approved equal. In no case shall anything less than Sch-40 be used.

2.05 CONDUIT FITTINGS:

- A. Fittings for rigid steel and IMC conduit shall be cast or malleable iron, cadmium or zinc plated, or at contractor's option, aluminum where acceptable by the N.E.C., and U.L. approved. Fittings shall be Appleton or approved equal.
- B. Fittings for electric metallic tubing shall be steel, set screw type, as manufactured by Electrical Products Division, Midland-Ross Corporation (Steel City) or an approved equal.

- C. Flexible metallic conduit fittings shall be of the "squeezed type", and galvanized or cadmium plated. Fittings shall be Appleton or approved equal.
- D. Fittings for "MC" cable systems shall be steel or die cast "MC" cable approved fittings suitable for the cable termination application as manufactured by RACO or an approved equal.
- E. Expansion fittings shall be flexible ground strip type and shall be used where conduit passes through structural expansion joints.
- F. Locknuts for rigid steel conduit shall be made of malleable iron or steel, zinc or cadmium plated.

2.06 CONDUCTORS:

- A. Wire and cable shall be as manufactured by Southwire, AIW General, or an approved equal.
- B. General wiring shall be furnished in sizes from #12 AWG through 500 kcmil inclusive. This wire shall be single conductor. Sizes #12 AWG thru 500 kcmil shall be stranded annealed copper with Type "THHN-THWN" 90°C. Dry-75°C. wet location, moisture and heat resistant, thermoplastic nylon jacketed insulation.
- C. Conductors for connections from outlet boxes near fixtures to recessed and semi-recessed lighting fixtures, shall be #14 AF stranded wire, minimum.
- D. Wire for use in fluorescent fixture wiring channels shall be polyvinyl chloride insulated, with not less than 15 mils of insulation and shall conform to U.L. requirements for fixture and appliance wire, Type "THHN", rated 90°C, 600 volt.
- E. Flexible cable for connections to movable equipment shall be Heavy-Duty, Cord Type "SO", as manufactured by Simplex or an approved equal. The cable shall have a green equipment ground conductor in addition to the current-carrying conductors.
- F. Type "MC" (Metal Clad Cable) shall be as manufactured by "AFC" or an approved equal. The cable shall consist of copper phase, neutral, and grounding conductors with type "THHN" thermoplastic insulation and galvanized steel or aluminum interlocked armor outside sheath enclosure.

2.07 DEVICE BOXES:

- A. Switch and outlet boxes, as required to make electrical installations complete, shall be sized in accordance with the National Electric Code and for which it is intended. Boxes shall be installed flush in masonry walls, in poured-in-place concrete walls and in drywall construction. Boxes shall be pressed steel, fabri-cated of not less than #14 USSG galvanized or sheradized as manufactured by Electrical Products Division of Midland-Ross Corporation (Steel City), Raco or an approved equal.
- B. Boxes for exterior receptacles, switches, lights, etc., shall be constructed of cast metal not less than 1/8" thick and shall be galvanized, sheradized or similarly treated to retard rusting. Boxes shall be provided with proper metal device plate and gaskets and shall be as manufactured by Appleton, Crouse Hinds, or an approved equal, for the specific application.

2.08 DEVICE PLATES:

- A. Device plates for convenience outlets shall be stainless steel, Pass & Seymour 97000 Series, by Hubbell or an approved equal. All switch plates shall be satin finished, stainless steel, Pass & Seymour 97000 Series, Hubbell or an approved equal.
- B. Cover plates for heavy duty receptacles shall be stainless steel or aluminum, designed to fit the receptacle installed.
- C. Outlet receptacles indicated as "weatherproof / weather resistant" and located outside the building, shall be equipped with an acrylic in use type, weatherproof, spring closing, gasketed cover, as manufac-tured by TyMac or an approved equal.

2.09 LIGHT SWITCHES:

- A. Light switches shall be mounted 4'0" to top of box above the finished floor unless otherwise shown on the drawings. Switches shall be as follows:

1. Single pole, 20 amp. 120/277 volt switch, Pass & Seymour #20AC1-1, Hubbell or an approved equal.
 2. Double pole, 20 amp. 120/277 volt switch, Pass & Seymour #20AC2-1, Hubbell, or an approved equal.
 3. 3-way switches shall be 20 amp., 120/277 volt Pass & Seymour #20AC3-1, Hubbell or an approved equal.
- B. Wall switches designated as motion sensor units with manual override and area ceiling mounted sensor units with power packs and other related equipment shall be furnished by and installed by the electrical contractor per specification shown on plans.

2.10 RECEPTACLES:

- A. Receptacles shall be mounted 4'-0" to top of box above the finished floor in the plant, warehouse and other unfinished areas and at 1'6" above the finished floor in the office and other finished areas unless otherwise shown on the drawings. Receptacles shall be as follows:
1. Receptacles shall be 120 volt, 20 ampere, duplex, grounded type, Pass & Seymour #5352-1, Hubbell or an approved equal. "IG" receptacles shall be #IG6300 and shall be orange in color.
 2. 30 ampere, 120 volt receptacles shall be grounded type, Pass & Seymour Series 5900 with Chrome X plate, Hubbell or an approved equal. Verify configuration with equipment to be supplied.
 3. Ground fault interrupter receptacles, 125 volt, 20 ampere shall be grounded type, Pass & Seymour #2091-FI with #1591 WP cover where re-quired; Leviton, Hubbell or an approved equal.

PART 3 - EXECUTION:

3.01 GENERAL:

- A. All work shall be performed in a finished and workmanlike manner by skilled mechanics under the direction of an experienced superintendent. Any work considered by the Engineer to be unsatisfactory from the standpoint of quality, appearance or conformance with the intent of the drawings and specifications, shall be corrected by the contractor at his expense, as directed by the Engineer.

3.02 CUTTING AND PATCHING:

- A. The contractor shall so organize and execute his work so as to avoid all unnecessary cutting and patching of building surfaces. Preparatory work, including accurate installation of sleeves, wall and floor openings and construction of equipment foundations and supports shall be coordinated with the building progress. Cutting, patching and repairs to damaged building surfaces, as a result of the installation, shall be provided without additional cost to the Owner.
- B. Certain work of a general construction nature related to the work under this section of the specifications will be provided by the contractor and will include preparation of building surfaces at points of raceway and duct penetrations, necessary masonry and concrete work, etc. The contractor shall be completely responsible for the correct dimensions and general scope of all general construction requirements related to his work. All corrections to such related work, determined to be improperly executed due to the negligence of the contractor shall be made at the contractor's expense.

3.03 EXCAVATION AND BACKFILLING:

- A. Contractor shall be responsible for excavation and backfilling for underground conduits. Work shall be performed in accordance with requirements described in Division 2 of the civil specification. Trenches shall be excavated true to line and shall be accurately graded to provide uniform bearing and support for each section of conduit; and before conduit is laid, the space between the conduit shall be filled with suitable material and thoroughly compacted.
- B. Backfill shall be deposited in uniform layers not exceeding 6" in thickness and compacted by hand or power devices to the density specified in 311000.

- C. All excavated materials not required or not suitable for backfill material shall be removed from the site by the contractor.

3.04 STARTER AND DISCONNECT ENCLOSURES:

- A. Enclosures shall be installed on the equipment they serve where possible. Where they have to be remote mounted and not installed on a wall, they shall be provided with an angle iron or unistrut support frame securely anchored to a foundation or building structure.
- B. All angle iron or unistrut support frames shall be painted with 2 coats of oil based enamel. Paint color shall be compatible with surrounding colors.
- C. Where installed on walls, they shall be fastened with proper size and type bolt/anchor type fasteners.

3.05 CONDUCTORS:

- A. All wiring shall be completed in accordance with applicable provisions of the National Electric Code and the conductor manufacturer's recommended procedures.
- B. Conductors shall be continuous from outlet to outlet. Splices shall be made in outlet or junction boxes and shall be mechanically and electrically perfect, using proper thickness of vinyl plastic tape. Connections with "Scotchlok" connectors or T & B PT pressure connectors will be permitted for wires #10 and smaller. Connections for wire sizes #8 and larger, shall be made with connectors as manufactured by Burndy or T & B solderless pressure crimp type connectors. Mechanical connectors of every kind shall be adequately insulated.
- C. All wire shall be color coded and marked in compliance with the National Electric Code. A different color shall be used for the phase, and the same color shall be used for the same phase throughout all 3-phase and feeder circuits.
- D. Not more than three (3) current carrying conductors (4-wire, 3-phase) may be served with a common neutral, but in no instance may a common neutral be used when two (2) circuits are connected to the same phase of the panelboard.

3.06 CONDUIT RACEWAY:

- A. Conduit installed under concrete floors, in direct contact with the earth, on the exterior of the building, where subject to mechanical damage (exposed and below 14'-0" A.F.F.) shall be rigid galvanized steel, or at the contractor's option, Intermediate Metal Conduit (IMC) may be used where acceptable by the N.E.C. Balance of conduit may be electric metallic tubing (EMT).
- B. Conduit shall be installed concealed in walls, floor (where shown on the plans) and ceilings. Where exposed conduit is necessary, it shall be run parallel to or at right angles to the building structures.
- C. Conduits shall be supported with approved type wall brackets, trapeze or strap hangers; securely anchored to the masonry or steel construction. Support intervals shall be outlined in Table 346-12 of the N.E.C. for rigid steel conduit and as outlined in Article 348 of the N.E.C. for electric metallic tubing (EMT). All conduit runs shall further be supported within 1' of all changes in directions.
- D. Minimum size conduit permitted under this section of the specifications shall be 1/2". Where a specific conduit size is not shown on the drawings, the N.E.C. shall be followed.
- E. Minimum size underground conduit permitted under this section of the specifications shall be 3/4".
- F. Separate conduit runs shall be provided for control, power, lighting, communication and special system wiring where indicated on the drawings.

3.07 "MC" CABLE SYSTEMS:

- A. Type "MC" (Metal Clad Cable) may be used in joist space, above drop ceiling, where approved by code and not subject to physical damage. Where run exposed it shall be located on structural members at right angles and parallel. Straps shall be out of the proper type and size located at intervals as recommended by the cable manufacturer. No "MC" cable is to be used for facility area receptacles other than packing work stations unless noted otherwise.

END OF SECTION

SECTION 26 1050
BUILDING GROUNDING SYSTEM

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

- A. Work included under this section shall consist of furnishing of all labor, materials, tools, equipment and supplies required to complete installation of the building grounding systems to the extent as shown on the drawings. Work shall include, but is not necessarily limited to, the following major items:
1. Supply and installation of all driven ground rods as shown on the plans.
 2. Supply and installation of driven ground rods and bare copper grounding system at each service entrance (pad mount transformer location) and main switchboard. This work to include jumper from grounding system into transformer secondary, main switchboard ground bus and connection to building footing rebar system.
 3. Supply and installation of all required exothermic welded connections to rods, conductors and building structural steel components.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

- A. General Conditions of the contract.
- B. Applicable requirements of Division 1 of the Technical Specifications apply to the work specified in this section.

1.03 ELECTRICAL GENERAL PROVISIONS:

- A. Comply with Section 260500; Part 1.

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with 2.01 of Section 260500.

2.02 GROUND RODS:

Driven ground rods shall be 3/4" in diameter x 10'0" long as manufactured by "Weaver" or and approved equal. Rods shall have a steel core with an exterior layer of pure copper. Where required, rods shall have threaded ends with connecting coupler for rod extensions.

2.03 GROUND CONDUCTORS:

Conductors for the grounding system loop, grid, jumpers and pig tails shall be as manufactured by Southwire or an approved equal. Conductors shall be annealed copper wire conforming to ASTM B-3 standard. Conductor sizes shall be as shown on the drawings, but no case any smaller than #2/0 AWG.

2.04 GROUNDING SYSTEM CONNECTIONS:

Grounding system connections shall be exothermic welded type. All required equipment to make proper exothermic welds at cable connections, cable to building structural members and cable to ground rod connections shall be as manufactured by "Cadweld".

PART 3 - EXECUTION:

3.01 GENERAL:

Comply with 3.01 of Section 16101.

3.02 CONDUCTORS:

Ground conductors shall be installed 1'6" below finished grade. Trenches shall be backfilled with suitable materials in 6" lifts to 93% density of standard proctor.

3.03 GROUND RODS:

Ground rods shall be installed by mechanical or manual driving means with rod tops at 1'6" below finished grade. In no case during the driving of any rods shall any water be used to quicken the process.

3.04 CONNECTIONS:

Grounding system connections shall be made using proper size shot molds for connection being done. No cracked or worn molds that could lead to an improper welded connection.

3.05 SYSTEM TEST:

The entire system shall be tested in accordance with "IEEE" Greenbook requirements for "Fall of Potential" method. Copies of ground system test results shall be provided to the owner and engineer.

END OF SECTION

SECTION 26 1910
SEISMIC RESTRAINT SYSTEMS

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

- A. Supply and installation of devices and other apparatuses required for seismic restraint of electrical luminaries and electrical equipment.
- B. Supply and installation of angle sway bracing for all suspended electrical equipment as required.

1.02 REFERENCES:

- A. International Building Code (IBC) 2012
- B. California Building Code (CBC), 2010
- C. Cooper B-Line SRS-02 – Seismic Restraints: Multi-Directional Bracing for Electrical Conduit, Cable Tray, and Mechanical Piping Systems
- D. ANSI/NFPA 70 – National Fire Protection Association (National Electrical Code)
- E. Federal Emergency Management Agency (FEMA) 413 - Installing Seismic Restraints for Electrical Equipment
- F. Federal Emergency Management Agency (FEMA) E-74 - Reducing the Risks of Nonstructural Earthquake Damage
- G. American Society of Civil Engineers (ASCE) 7-05 - Minimum Design Loads for Buildings and Other Structures

1.03 SUBMITTALS:

- A. Product Data: Provide manufacturer's catalog data and installation details for all supports and fasteners.
- B. Restraint selection and installation details shall be pre-approved by a professionally licensed engineer experienced in seismic restraint design.
- C. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties including Section Modulus (Sx) and Moment of Inertia (Ix).
- D. Submit seismic force level (Fp) calculations from applicable building code. Submit pre approved restraint selections and installation details from Cooper B-Line's Seismic Restraints catalog (SRS-02). [or engineer approved equal]

1.04 GENERAL:

- A. All electrical equipment shall be protected for no interruption of service, utilizing snubbers, neoprene mounting brackets with captive steel inserts and as specified. Equipment shall be protected for seismic Zone 4 with an importance factor "1.5".
- B. All isolators and isolation materials shall be of the same manufacturer and shall be selected and certified using published or factory certified data. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.
- C. All equipment whether isolated or non-isolated must include verifying calculations and analysis.
- D. Contractor shall install all isolators and restraints per written installation instructions submitted by isolation/seismic restraint manufacturer.
- E. The contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of piping, conduit, cable trays and other similar systems and equipment where required by the applicable building code.

1.05 MANUFACTURER RESPONSIBILITIES:

- A. Determine vibration isolation and seismic restraint sizes and locations including restraint anchorage to structure and equipment.
- B. Provide electrical equipment isolation systems and seismic restraints as scheduled and specified.
- C. Provide installation instructions and drawings.
- D. Provide calculations to determine restraint loads resulting from seismic forces presented in SBCCI 1988, governing codes, project seismic requirements, or 4.5G minimum seismic acceleration applied at the equipment center of mass whichever is more conservative. Seismic calculations shall be certified by a licensed engineer licensed in the State of California.
- E. Provide certification of seismic restraint capability to safely accept loads resulting from seismic forces determined by methods defined in Paragraph D, above. Certification must be substantiated by calculations.
- F. System Supports/Restraints: Firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.
- G. Bolted framing channels and fittings shall have the manufacturers name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

PART 2 - PRODUCTS:

2.01 PROTECTION DEVICES:

- A. Product types, ratings, quantity and fastener types shall be as recommended by Seismic Design.
- B. Manufacturer: Subject to compliance with these specifications, strut systems, pipe hangers, and accessories to be installed shall be as manufactured by Cooper B-Line, Inc. [or engineer approved equal].

2.02 SEISMIC BRACING COMPONENTS

- A. Steel strut shall be 1-5/8 wide in varying heights and mig-welded combinations as required to meet load capacities and designs indicated. A material heat code, part number, and manufacturer's name shall be stamped on all strut and fittings to maintain traceability to material test reports.
 - 1. Material for epoxy painted strut: ASTM A1011, SS, Grade 33
 - 2. Material for pre-galvanized strut: ASTM A653, SS, Gr. 33
 - 3. Material for Hot-Dip Galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.
 - 4. Material for fittings and accessories: ASTM A907 Gr. 33, Structural Quality or ASTM A1011, SS, Gr.33.
 - 5. Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

2.03 CODE INFORMATION

- A. This project is subject to the seismic bracing requirements of the California Building Code, 2010. The following criteria are applicable to this project.
 - 1. Seismic Zone Factor (Z, Table 16-I): [0.40]
 - 2. Soil Profile Type (CBC Table 1613.5.2) : Site Class 'D'
 - 3. Seismic Importance Factor (IP, Table 16 K): 1.5
 - 4. Component Amplification Factor (aP, Table 16-O): 1.0
 - 5. Component Response Mod. Factor (RP, Table 16-O): 3.0
 - 6. Seismic Coefficient (Fa): 1.075 - (Fv): 1.075

7. The total height of the structure (hr) and the height of the system to be restrained within the structure (hx) shall be determined in coordination with architectural plans and the General Contractor.
8. Forces shall be calculated for individual supports using the above information and requirements of Section 1632.
9. Exceptions to Table 16-O may be utilized. However, all use of exceptions shall be noted on submitted seismic bracing plan documents.

PART 3 - EXECUTION:

3.01 INSTALLATION:

- A. Except as otherwise indicated, seismic protection shall comply with manufacturer's instructions for the installation and load application to vibration isolation materials and units. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short-circuited by other contracts or bearing points. Remove space blocks and similar devices intended for temporary protection against overloading during installation.
- B. Locate isolation hangers as dictated by manufacturer near the overhead support structure as possible.
- C. Adjust leveling devices as required to distribute loading uniformly onto isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.
- D. All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.
- E. Installation of seismic restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.
- F. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.
- G. Do not install any equipment, piping, duct, or conduit that makes rigid connections with the building unless isolation is not specified.
- H. Prior to installation, bring to the architect's/engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.
- I. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult structural engineer of record.
- J. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The contractor shall submit loads to the structural engineer of record for approval in this event.
- K. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
- L. Provide reinforced clevis bolts where required.
- M. Seismic restraints shall be mechanically attached to the system. Looping restraints around the system is not acceptable.
- N. Do not brace a system to two independent structures such as a ceiling and wall.
- O. Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

3.02 ELECTRICAL EQUIPMENT SCHEDULE:

- A. The following equipment shall be seismically protected:
 1. All panelboards and switchgear.
 2. All conduits 2-1/2" or larger and more than 12" below the structure.
 3. Lighting fixtures.
 4. Dry type transformers.
 5. Luminaires.
 6. Pad mounted transformers.

3.03 GENERAL:

For seismic protective devices and calculations the Contractor is referred to:

Mason Industries, Inc.

2101 W. Crescent Ave, Ste D,

Anaheim, CA 92801,

Telephone: (714) 535-2727

Fax: (714) 535-5738

Email: info@masonanaheim.com

END OF SECTION

SECTION 26 3000
MEDIUM VOLTAGE DISTRIBUTION

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

- A. Work included under this section shall consist of furnishing of all labor, materials, tools, equipment and supplies required to complete installation of new 25 KV service. Work shall include but is not necessarily limited to the following major systems:
 - 1. Supply and installation of grounding system as shown on the drawings for the outdoor 25KV medium voltage switch and pad-mount transformers.
 - 2. Supply and installation of outdoor underground 25KV distribution system complete with all required cables and load break elbows. This work shall include all underground concrete encased 25KV primary conduits and pull and junction boxes to be furnished and installed.
 - 3. Provide, install and connect as required outdoor 25KV delta to 277/480 volt, 3 phase, 4 wire Delta-Wye connected oil filled pad mount transformers. The concrete pad for the transformers to be furnished and installed by electrical contractor.
 - 4. The electrical contractor shall be responsible for coordinating with the general contractor on all aspects of the installation of items by the general contractor that affect the electrical.
 - 5. Supply and installation of exterior conduit systems for primary conductors. This work to include installation of primary conductors and primary service equipment as specified in this section.
 - 6. Supply and installation of all 25 kV primary conductors complete with load-break elbows and required fittings for tap side of utility metering cabinets, medium voltage switch and loop-fed pad mount transformers.
 - 7. Supply and installation of identification marker tape in each trench above each conduit system. The tape shall describe what type of service is below.
 - 8. Supply and installation of metallic trace conductor in the trench for ease of conduit system locations.
- B. Supply and installation of exterior 25 KV distribution system cables complete with all required load/dead break elbows and required grounding. This work shall include complete system "HI-POT" testing for all cable and termination equipment

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

- A. General Conditions of the contract.
- B. Applicable provisions of the General Conditions and Division 1 of the Technical Specifications are included as part of this section.

1.03 ELECTRICAL GENERAL PROVISIONS:

Comply with Section 260500; Part 1

1.04 SHOP DRAWINGS:

Within three (3) weeks of the award of the contract the manufacturer shall provide to the Engineer eight (8) copies of shop drawings with plan views, front elevations, dimensions, weights, and information brochures for medium voltage switch and transformers for approval. Information shall also include manufacturing and shipping schedules.

1.05 EQUIPMENT CUT SHEETS:

Provide with the bid color cut sheets and sketches on all equipment showing general arrangements and features of the automatic transfer switch and transformers.

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with 2.01 of Section 260500.

2.02 CONDUIT RACEWAYS:

Comply with 2.04 of Section 260500.

2.03 CONDUIT FITTINGS:

Comply with 2.05 of Section 260500.

2.04 MEDIUM VOLTAGE CABLE:

- A. 25 KV cables shall be Southwire "Primary UD Type MV-105" medium voltage cable or an approved equal. Cable shall be copper compact stranded conductor, epr insulation, extruded strand shield, composite insulation shield and jacket w/ copper tape metallic shield. Cable to 133% insulation level. Cable shall be rated at 105°C and U.L. listed and labeled. These conductors to be furnished, installed, connected and "hi-pot" tested by the electrical contractor. The electrical contractor to furnish and install all cable 600 amp load-break elbows and termination lugs as required. Cable shall comply with UL 1072, ICEA, NEMA, IEEE and AEIC standards.
- B. 25 KV dead-break elbow termination kits and miscellaneous related components to be Cooper to match cable or an approved equal.

2.05 DEAD-BREAK ELBOWS

- A. Dead-break elbows for all primary conductor connections to be 600 A 25 kV rated
- B. 125 kV BIL
- C. 50 kV AC 60 Hz 1-minute withstand
- D. Minimum partial discharge extinction voltage: 26 kV
- E. Continuous ampere rating: 600 A rms
- F. 24 Hour overload ampere rating: 1000 A rms
- G. Short time ampere rating:
- H. 40 kA rms symmetrical for 0.20s
- I. 27 kA rms symmetrical for 4.0s
- J. T-body construction with semiconducting shield
 - 1. EPDM insulation
 - 2. Capacitive test point
 - 3. Compression type cable connectors

2.06 GROUND RODS:

- A. Ground rods shall be as specified in Section 261050 of this specification.

2.07 GROUND CONDUCTORS:

- A. Grounding system conductors shall be as specified in Section 261050 of this specification.

2.08 PAD MOUNT TRANSFORMERS:

- A. Pad mount transformer shall be 'Square-D', 'Cooper', 'GE' or approved equal. Transformers shall be provided with the following standard and other features:
 - 1. Liquid Filler: Envirotemp FR3
 - 2. Primary Voltage: 20800 Delta
 - 3. 125 KV BIL
 - 4. Secondary Volt: 480/277 volt, 3 phase, 4 wire WYE
 - 5. 30 KV BIL
 - 6. Standard 60 Hertz
 - 7. Impedance: 5.75% +/-7.5% Tolerance
 - 8. Conductor: Aluminum Windings
 - 9. Temp: 120 Degrees Insulation Class
 - 10. 65 Rise Over 30 AVG – 40 MAX AMB
 - 11. TAPS: 2-2.5% FCAN, 2-2.5% FCBN
 - 12. Altitude: STD. 3300 Feet Maximum
 - 13. 61 DB Sound Level
 - 14. MODIFICATIONS:

15. High Voltage Bushings and Terminals:
 16. Dead Front System
 17. 21 KV Loop Feed Dead Front
 18. Low Voltage Bushings:
 - a. Epoxy Tin Plated Copper Material 10 Hole Bushing
 19. Spade Secondary Spade Supports
 20. Primary Switching:
- B. 3 On/Off Switches
1. Overcurrent Protection
 - a. VFI W/ Interrupting Rating 16kA @ 25kV Class and visual break technology
 2. ACCESSORIES:
 3. 1" Drain Valve w/ 3/8" Sampler
 4. Dial Type Thermometer
 5. Liquid Level Gauge
 6. Standard Pressure Relief Diaphragm
 7. Nitrogen Test Port
 8. Paint Color Munsell #7.0gy-3.29/1.5
 9. Faulted Circuit Indicator (FCI)
 10. S.T.A.R. FCI #STHIA or approved equal
 11. Test point reset
 12. Provide FCI's on incoming side of primary feeder loop
 13. TRANSFORMER TESTS:
 14. Ratio Test
 15. Polarity Test
 16. Phase Relation Test
 17. No-Load Loss Test
 18. Excitation Current Test
 19. Impedance Voltage Test
 20. Lad Loss Test
 21. Applied Potential Test
 22. Induced Potential Test
 23. Leak Test
 24. Resistance Measurement Test
 25. Certified Test Report
 26. Factory QC Impulse Test
 27. Provide transformers with seismic qualifications.
- C. Pad mount transformer shall be designed, manufactured and tested in accordance with FM, ANSI, NEMA, CSA and IEEE standards and shall be U.L. AND FM listed and so labeled.

PART 3 - EXECUTION:

3.01 GENERAL:

Comply with 3.01 of Section 260500.

3.02 CONDUCTORS:

Comply with 3.06 of Section 260500.

3.03 CONDUIT RACEWAYS:

Comply with 3.04 of Section 260500.

3.04 GROUND RODS:

Ground rods shall be hand driven with the tops of the ground rod being a minimum of 1'6" below finished grade.

3.05 GROUND CONDUCTORS:

Ground conductors shall be installed in trenches in the earth with the conductor being a minimum of 1'6" below finished grade. Any exposed ground conductors in the building or above exterior grade shall be housed in conduit for areas as required by Section 16105.

3.06 GROUNDING SYSTEM:

All metal, non-current carrying parts of the electrical system shall be grounded in accordance with the latest specifications of the National Electric Safety Code and further in accordance with the requirements as shown on the drawings.

3.07 EXCAVATION AND BACKFILL:

Comply with 3.03 of Section 260500.

3.08 MEDIUM VOLTAGE CABLE:

- A. All medium voltage cables to be tested with "HIPOT" system per NETA and IEEE specifications unless test durations and voltages are limited by cable manufacturer and further in accordance with Section 260500 of this specification.
- B. All wiring shall be completed in accordance with applicable provisions of the National Electric Code and the conductor manufacturer's recommended procedures.
- C. Install and terminate all 25 KV conductors and dead break elbow kits in accordance with manufacturer's requirements.

END OF SECTION

SECTION 26 4000
SERVICE AND DISTRIBUTION

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

- A. Work included under this section shall consist of furnishing of all labor, materials, tools, equipment and supplies required to complete installation underground feeders, main switchboard, branch circuit panelboards, dry-type, step-down transformers and fan control systems. Work shall include, but is not necessarily limited to, the following major systems:
 - 1. Supply and installation of four (1) 4,000 ampere 480/277 volt 3 phase, 4 wire WYE connected free standing main switchboards. Switchboards to be complete with main circuit breaker with ground fault and anti-single phase protection 3 pole distribution branch circuit breakers, electronic metering and unit mounted "TVSS" unit.
 - 2. Supply and installation of underground secondary feeders between outdoor pad mounted transformer and indoor main switchboard.
 - 3. Supply and installation of 277/480 volt, 3 phase, 4 wire and 120/208 volt, 3 phase, 4 wire branch circuit panelboards. Panelboards to be complete with all required branch circuit breakers.
 - 4. Supply and installation of distribution panel for power to selected major 480 volt, 3 phase loads. Breaker sizes, types and numbers as detailed and scheduled on the drawings.
 - 5. Supply and installation of unistrut support frame systems for branch circuit panelboards as shown and detailed on the plans.
 - 6. Supply and installation of 480 volt, 3 phase Delta to 120/208 volt, 3 phase, 4 wire, Wye connected, dry-type, step-down transformers. This work to include required mounting hardware and platforms for transformers.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

- A. General Conditions of the contract.
- B. Applicable provisions of the General Conditions and Division 1 of the Technical Specifications are included as part of this section.

1.03 ELECTRICAL GENERAL PROVISIONS:

Comply with Section 26 0500; Part 1.

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with 2.01 of Section 26 0500.

2.02 FUSES:

Comply with 2.03 of Section 26 0500.

2.03 CONDUIT RACEWAYS:

Comply with 2.04 of Section 26 0500.

2.04 CONDUIT FITTINGS:

Comply with 2.05 of Section 26 0500.

2.05 CONDUCTORS:

Comply with 2.06 of Section 26 0500.

2.06 GROUND RODS:

Comply with 2.02 of Section 26 0500.

2.07 GROUND CONDUCTORS:

Comply with 2.03 of Section 26 0500.

2.08 MAIN SWITCHBOARDS:

- A. The service entrances main switchboards, 480/277 volt, 3 phase, 4 wire WYE connected, shall be free standing "Eaton" "POW-R LINE C" switchboards or an approved equal. The entire switchboard assemblies shall be uniform in height and depth (depth to be 36"). The switchboard assemblies and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of IEEE, PB-2, NEMA and shall be U.L. labeled for service entrance equipment. Major elements of the switchboards shall be as outlined below:
1. For 4,000 ampere switchboards, the main switch section shall house a 4,000 ampere 3 pole insulated case "Magnum SB" molded case breaker. Main circuit breaker types shall have EC trip unit, shunt trip, ground sensor, ground fault protection and anti single phase (phase reversal/under voltage) protection. Time delay to be adjustable. Electronic metering package shall be a "PXM2280" Series and shall be located in the main section. This section shall also house a integrated 160KA surge protection device (SPD). The SPD unit shall be built in accordance with UL1449 3rd Edition standards. The unit shall be Eaton, Liebert or an approved equal. The main circuit breaker to be provided with Breaker Status Feature. Metering package transformers to be provided with line and load side fuses (when VT's are required).
 2. The distribution sections shall house 3 pole insulated and molded case circuit breakers. Distribution breaker sizes, frames and numbers shall be as shown and scheduled on the plans.
 3. The main circuit breaker and all branch distribution circuit breakers to be provided with lockout devices.
 4. Main buses in the switchboards sections shall be full rated plated copper (no tapered busing) phase and neutral buses with a 1,000-ampere cross-ground bus. All bus connections shall be made with hardened steel bolts and pressure (Belleville) washers. Buses and all components to be braced for 65,000, 85,000 or 100,000 amperes "RMS" symmetrical fault current as shown on the plans. Provide switchboards with seismic qualifications.

2.09 DISTRIBUTION PANELS:

- A. Distribution panels (large amperage) 480 volt, 3 phase, 3 or 4 wire shall be "Eaton" "Pow-R-Line" or an approved equal. The entire panelboard and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of IEEE, ASA, NEMA and shall be U.L. labeled. Branch circuit distribution breaker numbers and sizes shall be as scheduled on the plans. Panel buses shall be plated copper. Buses and all components shall be braced for 42,000 amperes "RMS" symmetrical fault current or greater. See plans for actual bracing requirements. Provide distribution panels with seismic qualifications.
- B. Panels shall be designed, manufactured and tested in accordance with the latest applicable standards of IEEE, ASA, NEMA and shall be U.L. labeled for U.L. 508A standards. Panels shall include but are not necessarily limited to the following components for complete operation of the building.

2.10 BRANCH CIRCUIT PANELBOARDS:

- A. Panel boards shall be of the dead-front type and shall comply with UL and NEMA Standards for panel boards and enclosing cabinets, and so labeled.
- B. 277/480 volt, 3 phase, 4 wire lighting and power panel boards shall be "EATON" Type "POW-R LINE" as required for surface mounting, in sizes as required by the drawings.
- C. 120/208 volt, 3 phase, 4 wire lighting and power panel boards shall be "EATON" Type "POW-R LINE" for surface mounting, in sizes as required by the drawings.
- D. All 277/480-volt circuit breakers to have a minimum interrupting capacity of 14,000 amperes "RMS" symmetrical unless noted otherwise on the plans.
- E. All 120/208-volt circuit breakers to have a minimum interrupting capacity of 10,000 amperes "RMS" symmetrical unless noted otherwise on the plans.
- F. Panel board directories shall be neatly typewritten and shall be covered with a plastic cover.

- G. Panel board buses shall be plated electric grade aluminum and all panels shall have ground buses.
- H. Panel board shall be identified on the front outside cover with an engraved plastic nameplate.
- I. Provide panelboards with seismic qualifications.

2.11 DRY-TYPE TRANSFORMERS:

- A. Dry-type transformers shall be "EATON" specification line and shall meet the following requirements:
 - 480 volt, 3 phase Delta to 120/208 volt, 3 phase, 4 wire Wye shall have 220°C insulation with 150°C rising rating, conforming to IEEE, and NEMA specifications. These units shall have two (2) 2-1/2% FCAN and four (4) 2-1/2% FCBN taps and a maximum sound level as required by ANSI Standards. Transformers shall be standard rated unless shown as "K-13" on the drawings. Transformer sizes shall be as shown on the plans. Provide transformers with seismic qualifications.

PART 3 - EXECUTION:

3.01 GENERAL:

Comply with 3.01 of Section 26 0500.

3.02 CONDUCTORS:

Comply with 3.05 of Section 26 0500.

3.03 CONDUIT RACEWAYS:

Comply with 3.06 of Section 26 0500.

3.04 GROUND RODS:

Ground rods shall be hand driven with the tops of the ground rod being a minimum of 1'6" below finished grade.

3.05 GROUND CONDUCTORS:

- A. Ground conductors shall be installed in trenches in the earth with the conductor being a minimum of 1'6" below finished grade. Any exposed ground conductors in the building or above exterior grade shall be housed in conduit for areas as required by Section 26 0500.

3.06 GROUNDING SYSTEM:

- A. All metal, non-current carrying parts of the electrical system shall be grounded in accordance with the latest specifications of the national Electric Code and further in accordance with the requirements as shown on the drawings.
- B. The maximum resistance of the building grounding system shall not exceed 25 Ohms under normal, dry conditions. An additional rod shall be driven where this resistance is not achieved.
- C. The Electrical Contractor shall perform or have performed by a testing laboratory a test on the ground systems. Testing shall be done in accordance with the IEEE Green Book Test Procedures. Provide copies of test results to the Owner and Engineer.

3.07 EXCAVATION AND BACKFILL:

Comply with 3.03 of Section 26 0500.

3.08 SWITCHBOARDS:

Switchboards shall be installed in accordance with manufacturer's recommendations.

3.09 BRANCH CIRCUIT PANELBOARDS:

Branch circuit panelboards shall be installed with the uppermost circuit breaker (main or branch) at a maximum of 6' above finished floor.

3.10 DISTRIBUTION PANELS:

Distribution panels shall be installed and tested in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 26 5000

LIGHTING

PART 1 - GENERAL:

1.01 DESCRIPTION OF WORK:

- A. Work included under this section shall consist of furnishing of all labor, materials, tools, equipment and supplies required to complete installation of the building additions and renovations lighting systems to the extent shown and scheduled on the drawings. Work shall include, but is not necessarily limited to, the following major systems:
 - 1. Supply and installation of LED lighting systems, complete with interconnecting modular wiring system and conduit and branch circuit conductors.
 - 2. Supply and installation of lighting control system complete with ceiling/deck mounted photoelectric control devices, panelboard control units, power supplies, digital switch networks and interconnected data highway cable system.
 - 3. Supply and installation of wall and ceiling-mounted EXIT lighting systems, complete with interconnecting conduit and branch circuit conductors. These lights to be connected to the emergency generator. This work shall include exterior wall mounted CFL units located over man doors.
 - 4. Supply and installation of modular wiring systems throughout for the facility lighting systems. This work to include all required fittings, support materials, circuit starter boxes and luminaire pigtails. Pigtails to be provided to the luminaire manufacturer for factory installation to maintain the required U.L. labels.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

- A. General Conditions of the contract.
- B. Applicable requirements of Division 1 of the Technical Specifications apply to the work specified in this section.

1.03 ELECTRICAL GENERAL PROVISIONS:

Comply with Section 260500; Part I.

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with 2.01 of Section 260500.

2.02 CONDUIT RACEWAYS:

Comply with 2.04 of Section 260500.

2.03 CONDUIT FITTINGS:

Comply with 2.05 of Section 260500.

2.04 CONDUCTORS:

Comply with 2.06 of Section 260500.

2.05 BOXES:

Comply with 2.07 of Section 260500.

2.06 LUMINAIRES:

- A. Luminaries shall be U.L. listed and labeled and shall be complete with lamps, plates, rings, hangers, ballasts, lenses where required, trim and all other accessories necessary to accomplish a complete and secure installation.
- B. Luminaries types shall be as detailed and scheduled on the drawings or an approved equal.
 - 1. All LED drivers shall be constant current with 0-10v dimming capability and required heat dissipation.
 - 2. Voltage shall be as indicated on drawings. Universal voltage to be provided if available.

3. LED drivers and diodes shall have 10 year factory warranty. LED drivers in unconditioned warehouses shall be suitable for ambient temperatures of -40F to 131F.
4. LED lamps shall be long-life rated at 100,000 hrs. minimum, L70. Color shall be as indicated on drawings with a maximum 2.5 step MacAdam (2.5 SDCM) color variation. All fixtures to have a minimum CRI of 80+.

2.07 LIGHTING CONTROL SYSTEM:

- A. Lighting control system to be Eaton 'PRC2000' integral panelboard/smart breaker combination or approved equal. Complete system and components shall be designed, manufactured and tested in accordance with the latest requirement of the IEEE, ASA and NEMA and shall be U.L. listed and labeled. The system shall consist of but is not necessarily limited to the following major components:
 1. Ceiling/deck mounted photo control to provide 3 levels of lighting (daylight only, daylight and 4 lamps, daylight and 2 lamps or no daylight at all 6 lamps).
 2. Circuit breaker control devices to operate lighting circuits for 2 lamp, 4 lamp or 6 lamp operation throughout the zone they serve.
 3. Master control units in "master panels" (PRC2000) to control smart breakers in which it is housed as well as smart breakers housed in "extension" panels as detailed in the plans. Extension panels to be provided with auxiliary power supply as required.
 4. Digital switch network per master panel for manual override of control system. Digital switches to be located adjacent to lighting panelboard in each lighting control zone and circuited back to master panel. Provide power injector and 120V power at each digital switch as detailed in plans.
 5. Interconnecting control wiring between photo sensing devices and PRC2000 and circuit control devices and all data highway cabling systems.
- B. The entire system shall be connected to the main building management (BMS). Protocol shall be BACnet.

2.08 MODULAR WIRING SYSTEMS:

- A. Modular wiring systems shall be Acuity "Reloc" or an approved equal. Wiring systems shall be complete with all required fittings for cable-to-cable connections and T" fittings for connection of luminaire pigtails into the wiring systems. The entire system, all components and conductors to be rated for 30 ampere. All wiring, fittings and other components of the system shall be U.L. listed and labeled. All fittings shall be phase marked and set up to follow lighting circuits as shown on the drawings. The entire system shall comply with Article 504 of the N.E.C. Provide installation drawings to the contractor for proper field installation and connections.
- B. power and control conduit/conductors and control buttons to provide a complete system. The system shall consist of but is not necessarily limited to the following major components:

PART 3 - EXECUTION:

3.01 GENERAL:

Comply with 3.01 of Section 260500.

3.02 CONDUCTORS:

Comply with 3.05 of Section 260500.

3.03 CONDUIT RACEWAYS:

Comply with 3.06 of Section 260500.

3.04 MODULAR WIRING SYSTEMS:

Modular wiring systems shall be installed per manufacturers recommendations. Cables shall be run parallel and at right angles to roof structures. Support cables as required.

3.05 LIGHTING CONTROL SYSTEM:

Lighting control system and all remote items to be installed in accordance with the recommendation of manufacturer. Provide complete system shop and installation drawings and description of system operation.

END OF SECTION

SECTION 26 7210
FIRE ALARM SYSTEM

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

- A. Work included under this section shall consist of furnishing of all labor, materials, tools, equipment and supplies required for the complete installation of a building fire alarm system to the extent as shown on the drawings. Work shall include but is not necessarily limited to the following major items:
- B. Supply and installation of Fire Control Power Supply (FCPS) complete with all required modules, and battery back up.
 - 1. Supply and installation of "SLC" and "NAC" circuits as required.
 - a. Supply and installation of initiating and indicating field devices.
 - b. Supply and installation of relay modules to shutdown mechanical equipment including but not limited to Air Handling Units, Roof Top Units, and BAF Fans as shown
 - 2. Supply and installation of relay modules to release overhead door hold open devices as well as man door hold open devices as shown on the drawings. Install wire from dry contacts to hold open devices. The connection to controller is to be made by electrical contractor
 - a. Supply and installation of relay modules to shutdown conveyer panels as shown on the drawings. Install wire from dry contacts to conveyer panel. The connection is to conveyer panel to be made by others.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS OR DIVISIONS:

- A. General Conditions of the contract.
- B. Applicable requirements of Division 1 of the Technical Specifications apply to the work specified in this section.

1.03 ELECTRICAL GENERAL PROVISIONS:

Comply with Section 260500; Part 1.

PART 2 - PRODUCTS:

2.01 GENERAL:

Comply with 2.01 of Section 260500.

2.02 CONDUIT RACEWAYS:

Comply with 2.04 of Section 260500.

2.03 CONDUIT FITTINGS:

Comply with 2.05 of Section 260500.

2.04 MONITOR MODULES:

Monitor modules shall be Notifier # FMM-1 and FDM-1 or an approved equal. Modules shall be addressable and shall be mounted in 4" square boxes. Units shall be U.L. and F.M. listed and labeled.

2.05 SMOKE DETECTOR:

Smoke detectors shall be a Notifier #FSP-851 or an approved equal. Smoke detector shall be an addressable intelligent plug-in ionization unit with flash scan. Unit shall be U.L. and F.M. listed and labeled.

2.06 RELAY MODULE:

Relay module shall be a Notifier #FRM-1 or an approved equal. Unit shall be addressable, mount in a 4" box and U.L. and F.M. listed and labeled.

2.07 CONTROL MODULE:

Control module shall be Notifier FCM-1 or approved equal. Unit shall be addressable, mount in a 4" box and U.L. and F.M. listed and labeled.

2.08 DUCT SMOKE DETECTOR:

Duct Smoke detectors shall be Notifier #DNR(A) w/ #FSP-851(A) photoelectric with flash scan or approved equal. Provide metal sampling tube based on width of duct as required. Duct Detectors to be installed with Notifier RTS-151 Remote Led and Test Station located in a conspicuous location. Unit shall be U.L. and F.M. listed and labeled.

2.09 MANUAL PULL STATION:

Manual pull stations shall be Notifier NBG-12LX double action with flash scan or approved equal. Unit shall be U.L. and F.M. listed and labeled.

2.10 VISUAL AND AUDIO VISUAL DEVICES

- A. Visual alarm devices shall be Wheelock RSS-24MCW-24FR or approved equal.
- B. Audio Visual alarm devices shall be Wheelock NS-24MCWFR or approved equal.
- C. Unit shall be U.L. and F.M. listed and labeled.

2.11 FIRE CONTROL POWER SUPPLY (FCPS):

Fire Control Power Supply shall be Wheelock PS8 or approved equal. Quantities shown on drawings are approximate, equipment supplier to determine exact quantities. Unit shall be U.L. and F.M. listed and labeled.

2.12 SYSTEM CABLES:

- A. Cables for fire alarm system SLC loops and NAC circuits shall be as recommended by the manufacturer and sized according to voltage drop and current calculations.
- B. Verify exact numbers and routing of cables with equipment supplier before submitting of price.
- C. All underground conductors to be protected by lightning/surge protection.

PART 3 - EXECUTION

3.01 GENERAL:

Comply with 3.01 of Section 260500.

3.02 CONDUCTORS:

Numbers of conductors to make the system complete and operational shall be as required by manufacturer of system and devices. Conductors to be routed parallel and at right angles to building structural members.

3.03 CONDUIT RACEWAYS:

- A. All vertical fire alarm system conductors to be run in conduit in accordance with Section 260500 of this specification.
- B. Any required conductor taps or splices shall be made in proper type and size junction boxes in accordance with Section 260500 of this specification.

3.04 FIRE ALARM SYSTEMS:

- A. The entire fire alarm system shall be installed in accordance with the manufacturer's instructions for proper operation of the system.
- B. Control panel and devices of the system shall be installed in locations as shown on the drawings.

3.05 SYSTEM SHOP DRAWING:

- A. System equipment supplier shall provide to the contractor a shop drawing. Drawings shall show the contractor the correct number of conductors between devices and control panels and final wire connections to each item.

- B. Provide to the Owner, at the end of construction, a reproducible as-built drawing.

END OF SECTION

DIVISION 31 - SITEWORK

SECTION 31 2000

FOUNDATION AND TRENCH EXCAVATION AND BACKFILL

PART 1 - GENERAL:

1.01 SCOPE OF WORK:

Scope of work included under this Section of Specifications shall consist of, but is not necessarily limited to, following work elements:

Excavation and backfill required for sanitary sewer, storm sewer, drainage structures, underground water, sprinkler system pipe trenches, and other underground utilities. It is intended that specific Trade Contractors shall be responsible for excavating and backfill required for completion of their work.

Excavating and backfill work required for construction of building foundations, retaining walls, pits, and other structures.

Applicable provisions of the General Conditions and Division 01 of the Technical Specifications are included in the scope of this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

1.03 CODES AND STANDARDS:

Perform all excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

The contractor shall be solely responsible for the design, construction and installation of sheeting, bracing, shoring and other safety devices, in compliance with OSHA guidelines and any other governing regulations.

1.04 SOIL TESTING AND INSPECTION SERVICE:

Owner will employ a qualified independent testing laboratory and/or Soils Consultant to observe excavating and backfill work, to evaluate the adequacy of equipment, and to conduct required compaction tests as hereinafter specified.

Engineer will direct activities of laboratory. Copies of all laboratory reports shall be forwarded directly to Engineer, Owner, General Contractor and Trade Contractor.

1.05 SUBMITTALS:

SECTION 31 2000; FOUNDATION AND TRENCH EXCAVATION AND BACKFILL

Submit a laboratory analysis of granular backfill materials. Analysis shall describe proposed materials and shall include a gradation analysis tested in accordance with ASTM C136, Latest Edition. Materials shall be approved by Geotechnical Engineer prior to placement.

1.06 SITE INFORMATION:

Data indicated on subsurface conditions in the geotechnical report is not intended as complete representations or warrants of continuity of such conditions between soil borings. Subsurface conditions varying from available data and affecting cost or design considerations shall be brought to the attention of Engineer. No additional work shall be performed until Engineer has inspected and/or evaluated conditions and has authorized the work to continue.

Contractor shall be compensated for additional costs associated with unforeseen subsurface conditions. This compensation shall be based upon unit prices and field measurements by the testing laboratory.

1.07 EXISTING UTILITIES:

Prior to excavation, the contractor shall contact all local utility companies for location of all existing utilities associated with the site.

When active utilities are encountered, Contractor shall protect and support such utilities if they do not interfere with contract work and shall relocate interfering utilities as directed by Engineer. Contract price will be adjusted to cover cost of relocating, if this relocation is not readily ascertainable from drawings, surveys or site inspection.

In the event that uncharted or incorrectly charted piping or other utilities are encountered during excavation, Contractor shall consult Engineer immediately for directions. Contractor shall cooperate with Owner and utility companies in keeping respective services and facilities in operation. Damaged utilities shall be repaired to the satisfaction of utility owner.

Utility lines encountered during excavation, which are determined to be abandoned, shall be left in place except where they would interfere with contract work. In this event, encountered utility shall be removed as required to avoid this interference. Exposed ends of all abandoned lines shall be plugged or capped in a watertight manner.

1.08 USE OF EXPLOSIVES:

N/A

SECTION 31 2000; FOUNDATION AND TRENCH EXCAVATION AND BACKFILL

1.09 PROTECTION:

Comply with applicable provisions.

PART 2 - PRODUCTS:

2.01 SOIL BACKFILL:

On-site materials meeting the requirements of Select Fill Materials in Section 31 3000 of these specifications.

2.02 GRANULAR BACKFILL:

Materials shall be local, approved by Geotechnical Engineer.

PART 3 - EXECUTION

3.01 DEFINITIONS:

Refer to Section 31 3000.

3.02 UNSTABLE MATERIAL:

Unstable material encountered during excavation for footings, piers, etc., necessitating additional excavation shall be brought to the attention of Engineer.

Contractor shall be reimbursed for unstable soil excavation that could not readily be detected from available data or previous history in the area.

3.03 EXCAVATIONS:

Building foundation, retaining wall, equipment foundation, and pit excavations shall be carried to depth shown or called for on drawings with lateral clearance as required to permit construction of forms, placement of reinforcing steel, etc. Above lateral clearance shall not be required where concrete for slabs, walls or footing is authorized to be deposited directly against excavated surfaces. In this case, sizes of excavations shall be as shown or called for on drawings.

Trench excavation for pipes shall be made in open cuts. All pipe trenches shall be per all OSHA safety standards. Trenches shall be of sufficient width to provide ample room for workmen to handle pipe and make joints and to allow proper compacting of backfill around and under pipes. Pipe trenches shall be of sufficient depth to ensure a minimum pipe cover of 36" unless otherwise noted on drawings.

SECTION 31 2000; FOUNDATION AND TRENCH EXCAVATION AND BACKFILL

Strip footing and spread footing excavation shall be made to size required by drawings. Concrete shall be deposited directly against excavated surfaces. Bottoms of excavations for footings and foundations shall be constructed to a tolerance of plus or minus 0.1'. Excavations shall be hand trimmed to required lines and grades and provide a solid base for concrete. Selected footing excavations as directed by Engineer, shall be inspected by laboratory representative prior to pouring concrete.

3.04 DEWATERING:

Prevent surface water and sub-surface or ground water from flowing into excavations. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation and pit bearing surfaces.

Provide and maintain pumps, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations. Water shall be conveyed to collecting or run-off area outside excavation limits.

Temporary drainage ditches required for draining of accumulated water in excavations shall be the responsibility of contractor.

3.05 BACKFILLING:

Clean spaces to be backfilled of all debris and other foreign materials prior to placement of any backfill. No backfill shall be placed around concrete until all forms and shoring have been removed and concrete has set sufficiently to withstand any shocks or strains that may occur during backfilling and compaction work. Where required, backfill shall be carried up simultaneously on both sides of concrete structures. Walls subject to disturbance by compaction of backfill materials required on one side only shall be supported by shoring during such compaction.

Backfilling of pipe trenches shall not begin until pipe joint material has set and all pipes have been tested and approved. Backfill material in pipe trenches shall be placed by hand, filling from both sides to height of 1' above crown of the uppermost pipe. This initial backfilling shall be placed evenly and around and over pipe in layers, not exceeding 8" in loose depth, working in from both sides and shall be thoroughly hand tamped to required densities. After this initial backfilling, remaining backfill shall be placed by hand or machine in layers not exceeding 8" in thickness with each layer compacted to densities specified below.

Backfill required adjacent to concrete structures shall be deposited in layers not exceeding 8" in loose depth and each layer shall be compacted by means of mechanical tampers to densities specified below.