

NDSU



Richard D. Offerdahl '65 Engineering Complex Building 167

Fargo, North Dakota

**Bid Package 3
Project Specification Manual**

****See also McGough Bidding Documents****

Volume 1 of 2

September 12, 2024
ZBA Project No. 23-026

Architect of Record:
Zerr Berg Architects
510 4th Avenue North
Fargo, North Dakota 58102
P: 701.280.0187

Design Architect:
BWBR
380 St. Peter Street #600
St. Paul, MN 55102
P: 651.222.2701

Construction Manager:
McGough Construction
630 1st Avenue North #4
Fargo, ND 58102
P: 701.639.6282



**SECTION 00 0105
CERTIFICATIONS**


FOR THE:

North Dakota State University
Richard D. Offerdahl '65 Engineering Complex - Building 167
Fargo, North Dakota

ZERR BERG ARCHITECTS, INC.

PROJECT ARCHITECT

I here by certify that this specification was prepared by me or under my direct supervision, and that I am a duly Licensed Architect under the laws of the state of North Dakota.

 DATE September 12, 2024 LICENSE NO. 2911
Tyler J. Brandriet

HEYER ENGINEERING

STRUCTURAL CONSULTANT

I here by certify that this specification was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the state of North Dakota.

 DATE September 12, 2024 LICENSE NO. PE-4362
Jason Skiple

CMTA, INC.

MECHANICAL CONSULTANT

I here by certify that this specification was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the state of North Dakota.

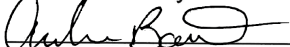
 DATE September 12, 2024 LICENSE NO. PE-7115

Cody D. Ellingson

CMTA, INC.

ELECTRICAL CONSULTANT

I here by certify that this specification was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the state of North Dakota.

 DATE September 12, 2024 LICENSE NO. PE-6525

Andrew A. Bartsch

DESIGN TEAM

FOR THE:

North Dakota State University
Richard D. Offerdahl '65 Engineering Complex - Building 167
Fargo, North Dakota

ZBA PROJECT NO. 23-026

ZERR BERG ARCHITECTS, INC.

510 4th Avenue North
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Tel: 701-280-0187

PROJECT ARCHITECT

BWBR ARCHITECTS, INC.

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DESIGN ARCHITECT

HEYER ENGINEERING

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STRUCTURAL CONSULTANT

CMTA, INC.

2201 12th Street North, Suite E
Fargo, ND 58102
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CIVIL, MECHANICAL, AND ELECTRICAL CONSULTANT

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32 3010 - Site Bollards (Not Issued with BP #3; Previously Bid)

32 9219 - Site Seeding (Not Issued with BP #3; Previously Bid)

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33 0513 - Site Manholes and Structures (Not Issued with BP #3; Previously Bid)

33 1416 - Site Water Distribution Piping (Not Issued with BP #3; Previously Bid)

33 3113 - Site Sanitary Gravity Piping (Not Issued with BP #3; Previously Bid)

33 4116 - Site Subdrainage Piping (Not Issued with BP #3; Previously Bid)

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41 2213.13 - Bridge Cranes

41 2313 - Paint Booth

END OF SECTION

**SECTION 00 4325
SUBSTITUTION REQUEST FORM - DURING PROCUREMENT**

The Substitution Request form shall be made part of these contract documents. A copy of the document is included herin.

END OF SECTION

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SUBSTITUTION REQUEST

Project: North Dakota State University Substitution Request Number: _____
Richard D. Offerdahl '65 Engineering Complex From: _____
 To: Zerr Berg Architects – Attn: Tyler Brandriet Date: _____
510 – 4th Ave. North, Fargo, ND 58102 A/E Project Number: 23-026
 Re: Substitution Request Contract For: _____

Specification Title: _____ Description: _____
 Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: New product 2-5 years old 5-10 years old More than 10 years old

Differences between proposed substitution and specified product: _____

Point-by-point comparative data attached

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: No Yes; explain _____

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

Proposed substitution changes Contract Time: No Yes [Add] [Deduct] _____ days.

Supporting Data Attached: Drawings Product Data Samples Tests Reports _____

SUBSTITUTION REQUEST (Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Specification Section 01330.
- Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by:

Date:

Additional Comments: Contractor Subcontractor Supplier Manufacturer A/E _____

**SECTION 01 2300
ALTERNATES**

PART 1 GENERAL

1.01 SUMMARY

- A. The bidder shall bid on each alternate specified as part of the specifications. Alternates not specifically requested will not be considered unless prior approval has been granted by the architect.
- B. The technical sections of these specifications shall also apply to the alternate work, whether so noted in each technical section or not.
- C. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.
- D. This Section includes administrative and procedural requirements governing Alternates.

1.02 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

1.03 SCHEDULE OF ALTERNATES

- A. Alternate No. 1:
 - 1. Previously Bid - Bid Package #1.
- B. Alternate No. 2:
 - 1. Previously Bid - Bid Package #1.
- C. Alternate No. 3:
 - 1. Previously Bid - Bid Package #1.
- D. Alternate No. 4:
 - 1. Not used.
- E. Alternate No. 5:
 - 1. Not used.
- F. Alternate No. 6:
 - 1. Not used.
- G. Alternate No. 7:
 - 1. Not used.
- H. Alternate No. 8:
 - 1. All bid package work associated with providing a new mechanical unit and connection to the chiller in Area D and part of Area E (Dolve Hall).
- I. Alternate No. 9:
 - 1. All bid package work associated with providing new mechanical units and connections to the chiller in Area F (ECE).
- J. Alternate No. 10:
 - 1. All bid package work associated with office finish upgrades in Area F (Offerdahl West / ECE) following Owner's asbestos abatement.
- K. Alternate No. 11:
 - 1. Not used.
- L. Alternate No. 12:
 - 1. Not used.
- M. Alternate No. 13:
 - 1. All bid package work associated with laboratory refits in Area F (Offerdahl West / ECE).
- N. Alternate No. 14:
 - 1. All bid package work associated with general refits in Area F (Offerdahl West / ECE).

O. Alternate No. 15

1. All bid package work associated with upgrading flooring in existing lab in Area C (Offerdahl North).

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coordination drawings.
- B. Submittals for review, information, and project closeout.
- C. Submittal procedures.

1.02 DEFINITIONS

- A. Coordination drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.
- B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.
- C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.03 PROJECT COORDINATOR

- A. Project Coordinator: Construction Manager.
- B. Make the following types of submittals to the Architect through the Project Coordinator:
 - 1. Requests for Interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Manufacturer's instructions and field reports.
 - 6. Applications for payment and change order requests.
 - 7. Progress schedules.
 - 8. Coordination drawings.
 - 9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 COORDINATION DRAWINGS

- A. Provide information required by Construction Manager for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect.

3.02 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Design data.
 - 3. Shop drawings.
 - 4. Samples for selection.
 - 5. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.03 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Certificates.
 - 2. Test reports.
 - 3. Inspection reports.
 - 4. Manufacturer's instructions.
 - 5. Manufacturer's field reports.
 - 6. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.04 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 in compliance with requirements of Section 01 7800 - Closeout Submittals:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.05 SUBMITTAL PROCEDURES

- A. Transmit each submittal with a copy of approved submittal form.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
- C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- E. 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.
- F. Deliver submittals to Construction Manager at business address or digitally.
- G. Schedule submittals to expedite the Project, and coordinate submission of related items.
- H. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- I. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- J. Provide space for Contractor and Architect review stamps.
- K. When revised for resubmission, identify all changes made since previous submission.
- L. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

M. Submittals not requested will not be recognized or processed.

END OF SECTION

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**SECTION 01 6000
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations.
- E. Procedures for Owner-supplied products.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 SUBMITTALS

- A. 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.
- B. 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.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.

2.02 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.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. Requests for substitution must be received in writing by the Architect no later than 7 days prior to bidding. Substitutions must be approved by Addendum.
- B. Any item specified by reference to the Commercial Standard, Federal Specification, trade association standard, or other similar standard shall comply with the requirements for design, manufacturer, and installation of the latest revision thereto in effect on the date of the Advertisement or Invitation for Bids. Where this specification requires a better quality than such standard, the specification shall govern.
- C. Where a proprietary material or method is specified for one use, the intention is to establish a standard of quality, performance, or size and not to exclude another product of equal or better

merit.

1. For items specified as above, bids shall be based on the items named in the specification or on items which the architect designates in specification or by addendum as an approved equal. An item named in the specifications or by addendum will be acceptable only when it meets all other requirements of the specifications, including the specifications of the manufacturer as of the date of the Advertisement or Invitation for Bids. Requests for approval of an item as equal will not be considered unless sufficient data for evaluation is received by the architect. The architect will consider delivery time and availability of service as well as the product itself in acting on a request for approval under provisions of this paragraph.
- D. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 2. Agrees to provide the same warranty for the substitution as for the specified product.
 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension that may subsequently become apparent.

3.02 OWNER-SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
 2. Arrange and pay for product delivery to site.
 3. On delivery, inspect products jointly with Contractor.
 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 3. Handle, store, install and finish products.
 4. Repair or replace items damaged after receipt.

3.03 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.

3.04 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to

excessive materials handling and misapplication. See Section 01 7419.

- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

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**SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Safety.
- G. Cleaning and protection.
- H. Starting of systems and equipment.
- I. Demonstration and instruction of Owner personnel.
- J. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- K. General requirements for maintenance service.

1.02 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.03 SAFETY

- A. Safety is the responsibility of each individual contractor. Each contractor shall comply with all local safety ordinances and OSHA regulations and requirements while performing the work.
- B. Each contractor is required to submit bound Material Safety Data Sheets (MSDS) to the Construction Manager, to be used for reference only, prior to transporting the material/chemical on site. In addition, it is the responsibility of each contractor to maintain an accessible MSDA file for their employees, subcontractors, sub-subcontractors, and suppliers that are on site.
- C. Each contractor shall submit evidence of an Employer Safety Program that complies with current OSHA regulations and requirements prior to beginning any contract work.
- D. The contractor and their subcontractor(s), sub-subcontractor(s), and suppliers shall take all necessary precautions to ensure the safety of the public and of workers on the job, and to prevent accidents or injury to any person, on, about, or adjacent to the premises where the work is being performed. The contractor and their subcontractor(s), sub-subcontractor(s), and suppliers shall comply with Federal or State OSHA regulations and all other laws, codes, ordinances, and regulations relative to safety and the prevention of accidents.
- E. The contractor shall designate a responsible representative at the jobsite as a safety representative who shall be responsible for the promotion of safety and prevention of accidents, and shall enforce all applicable laws, ordinances, codes, rules, regulations and standards pertaining to safety and prevention of accidents.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 2. Grid or axis for structures.
 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 1. Verify that construction and utility arrangements are as indicated.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
 1. Remove items indicated on drawings.
 2. Relocate items indicated on drawings.
 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

- a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
- 4. Verify that abandoned services serve only abandoned facilities.
- 5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
- J. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. During construction, each contractor and/or subcontractor, shall be responsible for daily cleaning up and removing from the building and site any boxes, excess materials, and other debris caused by his work which are easily assignable to the respective contractor or subcontractor. The debris shall be removed from the site by each contractor or it may be placed in the trash receptor noted under Paragraph C below. The construction site must be kept in a clean and neat state.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Division 23.

3.13 FINAL CLEANING

- A. Each contractor and/or subcontractor shall make a special effort to remove all debris caused by his work and to clean any soiling he has caused to the work of others. Thereupon, the Construction Manager shall make the arrangements for the final clean-up, unless noted otherwise, which shall include at least the following:
 1. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
 2. Use cleaning materials that are nonhazardous.
 3. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- B. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
 1. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean.
 2. Flooring: Resilient floors and quarry tile floors shall have their protection removed and floor wet-mopped. All maintenance type sealers shall be applied by Owner personnel.
 3. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned. Remove excess lubrication and other substances. Clean light fixtures and lamps.
 4. Replace filters of operating equipment.
 5. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
 6. General Work and Labor Contractor shall clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean, rake clean landscaped surfaces. Remove stains, spills, and other foreign deposits from paved areas.
 7. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
 8. Removal of all miscellaneous construction debris from the site will be by the General Work and Labor Contractor.

3.14 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- 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 when work is considered ready for Architect's Substantial Completion inspection.

- 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. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

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**SECTION 01 7800
CLOSEOUT SUBMITTALS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. McGough Bidding Documents: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 3. Submit two sets of revised final documents and a digital copy in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- B. Additional information as specified in individual product specification sections.
- C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- D. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.02 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and

maintenance of the specific products.

- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Include test and balancing reports.

3.03 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.
- J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.04 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch (216 by 279 mm) three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

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**SECTION 02 4100
BUILDING & SELECTIVE DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building demolition excluding removal of hazardous materials and toxic substances. (Previously Bid - Bid Package #1)
- B. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. See McGough Bidding Documents, for Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- B. See McGough B, for Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- C. Section 31 2324 - Building Fill: Filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of five years of documented experience.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SCOPE

- A. Remove the entire building (Previously Bid) and portions of building for alteration designated on drawings.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Use of explosives is not permitted.
 - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 5. Provide, erect, and maintain temporary barriers and security devices.
 - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.

- D. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- E. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
 - 3. Where practical, all concrete and asphalt shall be recycled.

3.03 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction as shown in drawings or as described in McGough Bidding Documents .
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 - 1. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification.
 - 2. See also Mechanical and Electrical drawings and specifications.
- F. Protect existing work to remain.
 - 1. Repair adjacent construction and finishes damaged during removal work.
 - 2. Patch as specified for patching new work.

3.04 DEBRIS AND WASTE REMOVAL

- A. Remove demolition materials, debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.

END OF SECTION

**SECTION 03 2000
CONCRETE REINFORCING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
 - 1. Strong Wall/Strong Floor only; foundation & slab on grade previously bid.
- B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete.
- B. Section 04 2000 - Unit Masonry: Reinforcement for masonry.

1.03 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- C. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- D. ASTM C 1116 Type III - Standard Specifications for Fiber-Reinforced Concrete.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
 - 1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the State in which the Project is located.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301.
- B. Installer Qualifications: Use 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 proper performance of the work of this section.
- C. Manufacturer Qualifications: Products used in the work of this Sections shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful productions acceptable to the Architect.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).
 - 1. Deformed billet-steel bars.
- B. Steel Welded Wire Reinforcement (WWR): Plain type; ASTM A1064/A1064M.
 - 1. Mesh Size and Wire Gage: As indicated on drawings.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch (1.29 mm).
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide plastic components for placement within 1-1/2 inches (38 mm) of weathering surfaces.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 318, ACI 315, ACI 318, and ACI 315.
- B. Number Type and Spacing of Supports and Other Accessories: Conform to ACI 315.

- C. Support and tie all reinforcing steel.
- D. Shop fabricate reinforcing steel to size, shape and dimensions.
- E. Defects not permitted:
 - 1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
 - 2. Bends or kinks not indicated on the Drawings or final Shop Drawings.
 - 3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 EXECUTION

3.01 PLACEMENT

- A. All bars shall be bent cold to the dimensions required before placing. Bends for ties shall be made around a pin having a diameter of not less than two times the thickness of the bar. Bends of all other bars shall be made around a pin having a diameter of not less than six times the minimum thickness of the bars.
- B. All bars shall be tagged and marked as to locations to facilitate placing of steel in the field. All the job site reinforcing steel shall be stored clear of the ground and protected from the damage and rusting.
- C. Do not displace or damage vapor barrier.
- D. Accommodate placement of formed openings.
- E. Maintain concrete cover around reinforcing as follows unless noted otherwise on the Drawings:
 - 1. Concrete against ground without use of forms: 3 inch for bars.
 - 2. Concrete against earth, but placed in forms: 2 inches.
 - 3. Concrete exposed to weather: 2 inches.
 - 4. Columns or beams not exposed to weather: 1-1/2 inches.
 - 5. Walls not exposed to ground or weather: 1 inch.
- F. Comply with applicable code for concrete cover over reinforcement.
- G. Bond and ground all reinforcement to requirements of Division 26.
- H. Notify Architect at least 24 hours prior to the pouring of concrete in any section of the structure. The pouring of concrete in any section before the steel for the entire section has been placed is prohibited.
- I. Where there is a delay in depositing concrete reinforcing steel shall be inspected and shall be cleaned dry of partially set concrete and other foreign matter before pouring resumes.
- J. Place temperature reinforcing for slabs on grade at the center of the slab.
- K. Splice reinforcing bars only where indicated on the Drawings.
- L. Do not bend bars after partially embedded in hardened concrete, except as shown on Structural Drawings.
- M. Chair up all slab reinforcing. Do not allow reinforcing to be at bottom of slabs. Lifting of bars during concrete slab pour is not acceptable.

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION

**SECTION 03 3000
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete for Strong Wall/Strong Floor only; foundations and floor slab previously bid.
- B. Concrete formwork.
- C. Concrete for composite floor construction.
- D. Floors and slabs on grade.
- E. Concrete elevator shaft walls and foundation walls.
- F. Concrete equipment pads. See mechanical and electrical drawings & specifications for sizes, locations, and reinforcement.
- G. Board insulation at perimeter foundation walls / grade beams
- H. Concrete reinforcement.
- I. Installation of miscellaneous and structural metal items provided by others including, but not limited to frame for walk off gratings, pipe bollards, strong floor tie-down connections, strong wall connections ,etc.
- J. Concrete curing and finishing.
- K. Installation of 6" free draining fill, supplied by the Building Earthwork Contractor, under all slabs on grade as indicated on drawings.
- L. Provide enclosures and temporary heat as required for concrete curing.
- M. Provide all necessary foundation wall bracing as required to withstand forces of backfilling without damage to the foundation walls.

1.02 RELATED REQUIREMENTS

- A. Section 03 2000 - Concrete Reinforcing.
- B. Section 03 3511 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.
- C. Section 03 3520 - Polished Concrete Floor Finishing.
- D. Section 05 5000 - Metal Fabrications: Miscellaneous metals provided by others and embedded in concrete.
- E. Section 07 9513 - Expansion Joint Cover Assemblies.
- F. Section 32 1313 - Concrete Paving: Sidewalks, curbs and gutters.

1.03 REFERENCE STANDARDS

- A. ACI 305R - Hot Weather Concreting; 2010.
- B. ACI 306R - Cold Weather Concreting; 2010.
- C. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.
- D. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- E. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
- F. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
- G. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- H. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- I. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

- J. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2011.
- K. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 1996 (Reapproved 2008).
- L. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.
- M. ASTM D 1752 - Specifications for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Concrete Mix Design:
 - 1. Employ independent testing laboratory to test proposed aggregate and design concrete mixes for each type of concrete required.
 - 2. Submit aggregate test reports and mix designs for approval 14 days prior to placing concrete.
 - 3. Test each type of fine and coarse aggregate for conformance to ASTM C33-78.
 - 4. Design mixes in accordance with ACI 301, Section 3.8.2, Method 1 or Method 2.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

1.05 QUALITY ASSURANCE

- A. Follow recommendations of ACI 305R when installing concrete during hot weather.
- B. Follow recommendations of ACI 306R when installing concrete during cold weather.
- C. Concrete Testing Service: Engage a testing agency acceptable to Architect to perform material evaluation test and to design concrete mixes.
- D. Installer Qualifications: Use 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 proper performance of the work of this Section.
- E. Manufacturer Qualifications: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- F. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor's expense.
- G. Listing and Labeling: Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

2.02 REINFORCEMENT MATERIALS

- A. Comply with requirements of Section 03 2000.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type II - Moderate Portland type - For all concrete exposed to earth
- B. Cement: ASTM C 150, Type IA - Air-entrained
- C. Cement: ASTM C 150, Type IIIA - Air-entrained - For exterior concreting
- D. Cement: ASTM C 150, Type I - Normal - All other concrete
- E. See Geotechnical Report for gradation of 6" free draining granular fill.
- F. Fine and Coarse Aggregates: ASTM C33/C33M.
 - 1. Acquire aggregates for entire project from same source.
 - 2. Maximum size of coarse aggregate: See Structural Drawings.
 - 3. Proportioning of ingredients shall be by Method 1 or 2.
- G. Concrete Strength: See Structural Drawings.
- H. Fly Ash: ASTM C618, Class C.
 - 1. Maximum Quantity: 25%.
- I. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- J. Structural Fiber Reinforcement: ASTM C1116/C1116M.
 - 1. Manufacturers:
 - a. Euclid Chemical Company: www.euclidchemical.com/#sle.
 - b. Fibermesh: www.fibermesh.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 CONCRETE MATERIALS, TYPES, STRENGTHS AND ADDITIVES

- A. Install mixes that provide following minimum requirements:
 - 1. Concrete design mixes shall have a min. 15% over-design of compressive strength.
 - 2. Type C fly ash from Coal Creek Station in Stanton, North Dakota may be used up to the maximum percentages shown in non-cold weather conditions. Do not use fly ash within 48 hours prior to or 72 hours after an air temperature of 50 degrees or lower exists. Do not use from November 1st till April 15th where concrete is not in a 28-day environment where the temperature is kept above 50 degrees. Fly ash will retard initial set.
- B. Footings, Footing Pads
 - 1. Low Alkali Cementitious Product Types:
 - a. Portland Type I or I/II.
 - b. Maximum 25% Fly Ash Allowed.
 - 2. Maximum Aggregate Size: 1-1/2".
 - 3. Max Slump: 5".
 - 4. 28 Day Compressive Strength: See Structural Drawin
 - 5. Max w/c Ratio: 0.55.
 - 6. Allowed Admixtures; Air Entrainment:
 - a. WRDA Series upon Approval.
 - b. Use of Entrained Air is Contractors Option.
- C. Foundation Walls, Piers, Grade Beams (IF NOT Exposed to Weather)
 - 1. Low Alkali Cementitious Product Types:
 - a. Portland Type I or I/II.
 - b. Maximum 20% Fly Ash Allowed.
 - 2. Maximum Aggregate Size: 3/4".
 - 3. Max Slump: 4".
 - 4. 28 Day Compressive Strength: See Structural Drawings.
 - 5. Max w/c Ratio: 0.53.
 - 6. Allowed Admixtures; Air Entrainment:
 - a. WRDA Series upon Approval.
 - b. Mid-Range Plasticizer With Prior Approval.

- c. Use of Entrained Air is Contractors Option.
- D. Foundation Walls, Piers, Grade Beams (IF Exposed to Weather)
 - 1. Low Alkali Cementitious Product Types:
 - a. Portland Type I or I/II.
 - b. Maximum 20% Fly Ash Allowed.
 - 2. Maximum Aggregate Size: ¾".
 - 3. Max Slump: 4".
 - 4. 28 Day Compressive Strength: See Structural Drawings.
 - 5. Max w/c Ratio: 0.45.
 - 6. Allowed Admixtures; Air Entrainment:
 - a. WRDA Series upon Approval.
 - b. Mid-Range Plasticizer OK.
 - c. Super Plasticizer With Prior Approval.
 - d. 5%-7% Entrained Air.
- E. Interior Slabs on Grade and Metal Form Deck
 - 1. Low Alkali Cementitious Product Types:
 - a. Portland Type I or I/II.
 - b. Maximum 20% Fly Ash Allowed (Will Retard Initial Set).
 - 2. Maximum Aggregate Size: 1".
 - 3. Max Slump: 5".
 - 4. 28 Day Compressive Strength: See Structural Drawings.
 - 5. Max w/c Ratio: 0.45.
 - 6. Allowed Admixtures; Air Entrainment:
 - a. WRDA Series upon Approval.
 - b. Mid-Range Plasticizer With Prior Approval.
 - c. Super Plasticizer With Prior Approval.
 - d. 5% Entrained Air is Contractors Option.
- F. Exterior Horizontal Concrete on Metal Form Deck
 - 1. Low Alkali Cementitious Product Types:
 - a. Portland Type I or I/II.
 - b. Maximum 25% Fly Ash Allowed.
 - c. Use min. 564 Lbs. of Cementitious Materials.
 - 2. Maximum Aggregate Size: ¾".
 - 3. Max Slump: 4".
 - 4. 28 Day Compressive Strength: See Structural Drawings.
 - 5. Max w/c Ratio: 0.44
 - 6. Allowed Admixtures; Air Entrainment:
 - a. WRDA Series upon Approval.
 - b. Mid-Range Plasticizer OK.
 - c. Super Plasticizer With Prior Approval.
 - d. 5%-7% Entrained Air.
- G. Stair Pan Fill
 - 1. Low Alkali Cementitious Product Types:
 - a. Portland Type I or I/II.
 - b. Maximum 10% Fly Ash Allowed.
 - 2. Maximum Aggregate Size: Sand Mix with ALL Material Passing a #16 Sieve.
 - 3. Max Slump: 4".
 - 4. 28 Day Compressive Strength: 4,000 psi.
 - 5. Max w/c Ratio: 0.50.
 - 6. Allowed Admixtures; Air Entrainment:
 - a. WRDA Series upon Approval.
 - b. Mid-Range Plasticizer With Prior Approval.
 - c. Super Plasticizer With Prior Approval.

- d. No Entrained Air.
- e. 2 Lbs./CY Fibermesh Reinforcement.

2.05 ADMIXTURES

- A. Air Entrainment Admixture: ASTM C260/C260M.

2.06 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene, polyolefin, or equivalent, complying with ASTM E 1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single ply polyethylene is prohibited.
 - 1. Thickness: 15 mils min.
 - 2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
 - 3. Manufacturers:
 - a. ISI Building Products; Viper VaporCheck II 15-mil (Class A): www.isibp.com.
 - b. Stego Industries, LLC; Stego Wrap Class A (15 mil): www.stegoindustries.com.
 - c. W. R. Meadows, Inc; PERMINATOR Class A - 15 mils (0.38 mm): www.wrmeadows.com.
 - d. Raven Industries; Vaporblock VB15.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

2.07 BONDING AND JOINTING PRODUCTS

- A. Waterstops: Bentonite and butyl rubber, complying with NSF 61 and NSF 372.
 - 1. Manufacturers - Basis of Design: Bentonite Waterstop EC Plus, by W.R. Meadows.
 - 2. Acceptable substitute: Type 20 or 23 Earthshield, by JP Specialties.
 - a. Substitutions: See Section 01 6000-Product Requirements.
 - 3. Locations: as indicated on the drawings, at the transition between all footings / pile caps and foundation walls / grade beams at lower level and elevator pit. Also between pours / cold joints.

2.08 CURING MATERIALS

- A. Curing and Sealing Compound, Low Gloss (Conc-S): Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309 Type 1 Class A.
 - 1. Manufacturers:
 - a. W. R. Meadows, Inc; VOCOMP-25: www.wrmeadows.com.
 - b. Eucocure by Euclid Chemical Co.
 - c. Cureseal WB by LM Scofield.
 - d. Kure 1315 by BASF.
 - e. Dress & Seal WB by L&M Construction Chemicals.
 - f. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Verify that forms are clean and free of rust before applying release agent.
- B. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- C. Fillets shall be used at all exposed to view interior corners.
- D. No wood braces or spreaders shall be concreted in.
- E. The contractor shall assume full liability for all damage due to the removal of forms.
- F. Because of interest outside those of the contractor, he shall notify the other contractors so affected before the removal of any forms.

- G. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade where indicated in the drawings. Lap joints minimum 12 inches (300 mm). Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
- H. Cold weather concrete work shall be in accordance with ACI 306.66
- I. See McGough Bid Documents for temporary heat requirements.
- J. Trenches and all other portions of work shall be kept free from standing water. Wherever the bottom of the excavations have become saturated with water, loose and wet dirt shall be removed just before rebar is placed and concrete is poured. Removal by this Section.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 BOARD INSULATION INSTALLATION AT FOUNDATION PERIMETER

- A. Install according to manufacturer's written instructions.
- B. Install boards horizontally on foundation perimeter.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation place.

3.05 PLACING CONCRETE

- A. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to furnish and install embedded items before the concrete is placed.
- B. Notify Architect not less than 24 hours prior to commencement of placement operations.
- C. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- D. Provide adequate wall bracing for back filling work. Any walls damaged or that move due to inadequate bracing during backfilling shall be replaced by the concrete contractor. It is possible that backfilling requiring bracing could be accomplished before the first floor slab has been installed.

3.06 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
 - 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.

3.07 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness at all locations except Strong Wall/Strong Floor:
 - 1. Exposed Concrete Floors: 1/4 inch (6 mm) in 10 feet (3 m).
 - 2. Under Seamless Resilient Flooring: 1/4 inch (6 mm) in 10 feet (3 m).
 - 3. Under Carpeting: 1/4 inch (6 mm) in 10 feet (3 m).
 - 4. Under Tile Flooring: 1/8 inch (3mm) in 10 feet (3 m).
- B. Maximum Variation of Surface Flatness at Strong Wall/Strong Floor:
 - 1. Floor and Wall Flatness: 50 SOFf (1/8" in 10'-0")
 - 2. Floor and Wall Levelness : 35 SOFI (1/8" in 10'-0")
- C. Correct the slab surface if tolerances are less than specified.

- D. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Remeasure corrected areas by the same process.

3.08 CONCRETE FINISHING

- A. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.
- B. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Patch tie holes and defects.
- C. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.
 - 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
- D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.
- E. Upon completion of the project, floors which are exposed shall be thoroughly cleaned and dried and given one additional coat of sealing/curing agent. All construction joints, saw cut joints etc., shall be filled with floor filler before final sealing.

3.09 CURING AND PROTECTION

3.10 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.
- B. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- C. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards (76 cu m) or less of each class of concrete placed.
- E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.11 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

3.12 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

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**SECTION 03 3511
CONCRETE FLOOR FINISHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.
- B. Polished Concrete.
- C. Curing Materials.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.05 MOCK-UP

- A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
- B. Mock-Up Size: 10 feet (3 m) square.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.07 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet (2.5 m) above the floor surface over each 20 foot (6 m) square area of floor being finished.
- B. Do not finish floors until interior heating system is operational.
- C. Maintain ambient temperature of 50 degrees F (10 degrees C) minimum.

PART 2 PRODUCTS

2.01 CURING MATERIALS

- A. Curing and Sealing Compound, Low Gloss (CONC-S): Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1, Class A.
 - 1. Products:
 - a. BASF; Kure 1315.
 - b. Euclid Chemical Company; Eucocure.
 - c. LM Scofield; Cureseal WB.
 - d. L&M Construction Chemicals, Inc; Dress & Seal WB.
 - e. SpecChem, LLC; Cure & Seal WB 30.
 - f. Substitutions: See Section 01 6000 - Product Requirements.

2.02 POLISHED CONCRETE SYSTEM

- A. Polished Concrete System (CONC-P): Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.
 - 1. Acceptable Systems:

- a. Ameripolish, Inc; Ameripolish Polished Concrete System: www.ameripolish.com.
- b. L.M. Scofield Company; SCOFIELD Formula One Ground & Polished Concrete Systems; SCOFIELD® Formula One™ Lithium Densifier MP: www.scofield.com.
- c. PROSOCO, Inc; Consolideck Polished Concrete System: www.prosoco.com/consolideck.
- d. W. R. Meadows, Inc; Induroshine: www.wrmeadows.com.
- e. Substitutions: See Section 01 6000 - Product Requirements.
- 2. Pre-Densifier Concrete Cleaner: As recommended by manufacturer.
- 3. Penetrating Concrete Hardener/Densifier:
 - a. VOC: Contains 50 g/L or less.
 - b. Abrasion Resistance: Greater than 50 percent improvement over untreated samples when tested in accordance with ASTM C1353.
 - c. Achieve "High Traction Range" readings when tested in accordance with ANSI B101.1.
 - d. Coefficient of Friction: Greater than 0.60 dry, greater than 0.60 wet when tested in accordance with ASTM C1028.
 - e. Adhesion: Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
 - f. Water Vapor Transmission: 100 percent retained when compared to untreated samples when tested in accordance with ASTM E96/96M Method B (Water Method).
 - g. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.
- 4. Concrete Dye: As recommended by manufacturer.
 - a. General purpose water-carried, penetrating, translucent colored dye.
 - b. Color: As selected by the architect from manufactured full range.
- 5. Interior Concrete Protective Treatments: As recommended by manufacturer.
 - a. General purpose high-gloss film forming premium sealer, lithium silicate hardener/densifier.
- 6. Joint Filler: Install semi-rigid joint filler product in all saw-cut joints and at the interface between concrete and other flooring materials.
 - a. Basis of Design Product: Edge Pro-80 by Metzger / McGuire, or similar Polyurea sealant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.
- E. Where sealed concrete is scheduled, apply initial coat of sealer/curing agent per the manufacturer's instructions. Upon completion of the project, exposed floors shall be thoroughly

cleaned, dried, and given one additional coat of sealing/curing agent. All construction joint, saw cut joints, etc. shall be filled with floor filler before final sealing.

3.04 CONCRETE POLISHING

- A. Class 3: High Reflectivity, 800 grit.
- B. Floor grind aggregate level should be Medium Aggregate Exposure. Mainly 1/8" to 1/4" aggregate, with paste and large aggregate randomly exposed and stained.
- C. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.
- D. Protect walls and adjacent finished surfaces as required throughout contractors scope of work.

END OF SECTION

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**SECTION 04 2000
UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
 - 1. Standard grey and ground faced block for above grade and interior locations.
 - 2. Below grade infill previously bid.
- B. Clay facing brick.
- C. Ceramic glazed face brick.
- D. Mortar and grout.
- E. Reinforcement and anchorage.

1.02 RELATED REQUIREMENTS

- A. Section 07 1300 - Sheet Waterproofing: Waterproofing masonry surfaces below grade.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a (Reapproved 2014).
- D. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2011.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- F. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2014.
- G. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- H. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units; 2015.
- I. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- J. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- K. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- L. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- M. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- N. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.
- O. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2016.
- P. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2005.
- Q. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- R. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.
- S. UL (FRD) - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Samples: Submit 3 samples of each type texture color and finish of units to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Fire Rated Assemblies: Comply with applicable code for designated requirements for fire rated masonry construction.
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Handle and store masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.
 - 1. If units become wet, do not install until they are in an air-dried condition.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Approved manufacturers:
 - a. Amcon Block.
 - b. Anchor Block.
 - c. Concrete Materials Inc.
 - d. Structural Block, Inc.
 - e. Substitutions: See Section 01 6000-Product Requirements.
 - 2. Size: Standard units with nominal face dimensions of 16 by 8 inches (400 by 200 mm) and nominal depths as indicated on drawings for specific locations.
 - 3. Special Shapes: Provide non-standard blocks configured for corners, lintels, headers, control joint edges, and other detailed conditions.
 - 4. Non-Loadbearing Units: ASTM C129.
 - 5. Ground Rockfaced Masonry Units:
 - a. Style: Burnished to match existing.
 - b. Colors: To match existing.
 - c. Provide ground rockface and smooth finishes, sizes, coursings, etc. as shown on the drawings.
 - d. Provide "Dry Block" admixture.
 - e. Provide corner units with ground rock faced ends as required.
 - f. Supplier of exterior concrete masonry units shall guarantee that the finished product will not be stained or damaged due to iron or shale deposits in the face of the concrete masonry units. This warranty shall remain in effect for a period of 5 years.
 - g. Provide two coats of gloss solvent based high lighter (interior and exterior). One coat shall be factory applied and one coat shall be applied after masonry is installed and cleaned.
 - 1) Product: TK Products; TK-Bright Kure & Seal, gloss or equal.

2.02 BRICK UNITS

- A. Manufacturers:
 - 1. Hebron Brick Company; www.hebronbrick.com.
 - 2. Glen-Gery Corporation; www.glengery.com.
 - 3. Substitutions: See section 01 6000 - Product Requirements.
- B. Facing Brick: ASTM C216, Type FBS, Grade SW.
 - 1. Color and texture: Blend by Hebron Brick Company.
 - a. Brick 1:
 - 1) Color: Red.
 - 2) Texture: Rugg.
 - 3) Quantity: 75%.
 - b. Brick 2:
 - 1) Color: Garnet.
 - 2) Texture: Rugg.
 - 3) Quantity: 25%.
 - 2. Nominal size: Norman - 3 5/8" x 2 1/4" x 11 5/8".
 - 3. Special shapes: Molded units as required by conditions indicated, unless standard units can be cut to produce equivalent effect.
 - 4. Compressive strength: As indicated on drawings, measured in accordance with ASTM C67/C67M.
- C. Glazed Brick (Double Fired, Brick Units):
 - 1. Glazed Facing Brick: ASTM C216, Type FBX, Grade SW with ceramic glaze complying with ASTM C126.
 - 2. Color and texture: Stone Gray Klaycoat and Charcoal Klaycoat as manufacture by Glen-Gary.
 - 3. Nominal size: Modular.
 - 4. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn without chipping glaze to produce equivalent effect.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M, Type N.
- B. Portland Cement: ASTM C150/C150M, Type I.
 - 1. Hydrated Lime: ASTM C207, Type S.
 - 2. Mortar Aggregate: ASTM C144.
 - 3. Grout Aggregate: ASTM C404.
- C. Concrete Grout for Bond Beams, Lintels, etc.: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - 1. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
 - 2. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
 - 3. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C 476 for fine and coarse grout.
 - 4. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
 - 5. Do not use anti-freeze compounds to lower the freezing point of grout.
- D. Water: Clean and potable.
- E. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.
- F. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Color: Mineral pigments added as required to produce approved color sample.
 - a. Up to three mortar colors may be required, one to match each brick type as well as one to match ground faced concrete units. Verify mortar colors with architect prior to laying up mock-up panel.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
 - 1. Blok-Lok Limited: www.blok-lok.com.
 - 2. Hohmann & Barnard, Inc: www.h-b.com.
 - 3. WIRE-BOND www.wirebond.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420) deformed billet bars; uncoated. See Section 03 2000 - Concrete Reinforcing for additional rebar requirements, preparation and installation. See drawings for spacing and sizes.
- C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Truss or ladder.
 - 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
 - 3. Size: 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not less than 5/8 inch (16 mm) of mortar coverage on each exposure.
- D. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Truss, with adjustable ties or tabs spaced at 16 in (406 mm) on center.
 - 2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.
 - 3. Size: 0.1875 inch (4.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods and adjustable components of 0.1875 inch (4.8 mm) wire, width of components as required to provide not less than 5/8 inch (16 mm) of mortar coverage from each masonry face.
 - 4. Vertical adjustment: Not more than 1 1/4 inches (32 mm).
 - 5. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.
- E. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch (4.8 mm) thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not less than 5/8 inch (16 mm) of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in (32 mm).
- F. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 1. Anchor plates: Not less than 0.075 inch (1.91 mm) thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
 - 2. Wire ties: Manufacturer's standard shape, 0.1875 inch (4.75 mm) thick.
 - 3. Vertical adjustment: Not less than 3-1/2 inches (89 mm).

2.05 FLASHINGS

- A. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
 - 1. Stainless Steel Flashing - Self-adhering: ASTM A240/A240M; 2 mil (0.05 mm) type 304 stainless steel sheet with 8 mil (0.20 mm) of butyl adhesive and a removable release liner.
 - a. Basis of Design: York Manufacturing, Inc; York 304: www.yorkmfg.com.
 - 1) Stainless Steel Accessories: Provide prefabricated end dams, inside corners, and outside corners.
 - b. Other Acceptable Manufacturers:
 - 1) STS Coatings, Inc: www.stscoatings.com.
 - 2) VaproShield, LLC: www.vaproshield.com.
 - 3) WIRE-BOND: www.wirebond.com.
 - 4) Substitutions: See Section 01 6000 - Product Requirements.
- B. Termination Bars: Stainless steel; compatible with membrane and adhesives.
- C. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.

2.06 ACCESSORIES

- A. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.
- B. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 - 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
- C. Weeps:
 - 1. Weeps: Molded PVC grilles, insect resistant(typical).
 - 2. Color(s): As selected by Architect from manufacturer's full range.
- D. Cavity Vents:
 - 1. Type: Extruded propylene with honeycomb design.
 - 2. Color(s): As selected by Architect from manufacturer's full range.
- E. Cleaning Solution (where applicable): Non-acidic, not harmful to masonry work or adjacent materials.
 - 1. Masonry Cleaner:
 - a. Sureklean as manufactured by Process Solvent Company, Inc., Kansas City, Kansas.
 - b. S-C Clean No. 88 as manufactured by S-C Industries, Minneapolis, MN.
 - c. Approved equal.
 - 2. Rinseless Cleaner:
 - a. Stand Off Rinseless Cleaner as manufactured by ProSoCo (Process Solvent Company, Inc., Kansas City, Kansas).
 - b. Approved equal.
 - 3. Maintenance Degreaser:
 - a. Stand Off Maintenance Degreaser as manufactured by ProSoCo.
 - b. Approved equal.
 - 4. Compressible Joint Filler: Mineral wool semi-rigid or batting as required for condition.

2.07 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Masonry below grade and in contact with earth: Type S.
 - 2. Exterior, loadbearing masonry: Type N.
 - 3. Exterior, non-loadbearing masonry: Type N.
 - 4. Interior, loadbearing masonry: Type N.
 - 5. Interior, non-loadbearing masonry: Type O.
 - 6. Interior, non bearing partitions and fireproofing: Types M,S,N, and O.
 - 7. Masonry not otherwise specified: Types M or S.
- B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm).
- C. Mixing: Use mechanical batch mixer and comply with referenced standards.
- D. Materials that have partially set shall not be retempered or used. Frozen, caked, or lumpy materials shall not be used. Mixers and boxes shall be thoroughly cleaned of all set or hardened mortar before the materials for a new batch are loaded.
- E. Field Samples may be taken and laboratory tests conducted to determine if water retention and compressive strength of the mortar meets the requirements, the architect shall have the right to order a change in the mix or in the water content of the mortar. In an extreme case of mortar failure, the architect may order the wall represented by such tests to be replaced.

PART 3 EXECUTION

3.01 EXAMINATION

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

- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.
- B. Install wall insulation as indicated on drawings and in accordance with manufacturer's recommendations.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Vertical joints of alternate courses shall be correctly centered, one over another and the faces of all walls shall be plumb and true.
- D. Concrete Masonry Units:
 - 1. Bond: Running or as shown on project drawings.
 - 2. Mortar Joints: Concave.
- E. Brick Units:
 - 1. Bond: Stacked at new construction, running at infill areas, or as shown on project drawings.
 - 2. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Interlock intersections and external corners.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- H. All masonry partitions shall be laid up to the bottom of the covering precast deck. Where structural joints fall directly over the partitions, the partition shall be laid up to the bottom of the covering deck. Where structural beams fall directly over the partition, the partition shall be laid up to the bottom of the beam.
- I. Isolate top joint of masonry partitions from horizontal structural framing members, slabs or decks with compressible joint filler.

3.06 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches (600 mm) on center for weep vents and 16 inches (400 mm) on center for cotton rope weeps. Provide a minimum of (2) weeps at all locations.

- B. Install anti-mortar protections for weeps as detailed in a continuous row at base of wall and over all wall openings directly on flashing.
- C. Install cavity vents in veneer and cavity walls at 32 inches (800 mm) on center horizontally below shelf angles and lintels and near top of walls.

3.07 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Wall openings shall be reinforced every course requiring continuous course.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches (150 mm).
- E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches (900 mm) horizontally and 16 inches (400 mm) vertically.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches (400 mm) on center vertically and 36 inches (900 mm) on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.
- B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches (400 mm) on center vertically and 24 inches (600 mm) on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.

3.10 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing where applicable to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up flashing ends at least 1 inch (25.4 mm), minimum, to form watertight pan at non-masonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Terminate flashing up 8 inches (203 mm) minimum on vertical surface of backing:
- C. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.
- D. Extend plastic, laminated, and EPDM flashings to within 1/2 inch (12 mm) of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.

3.11 LINTELS

- A. Install loose steel lintels over openings.

3.12 GROUTED COMPONENTS

- A. Lap splices minimum 48 bar diameters.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.

3.13 GROUTING

- A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.

3.14 CONTROL AND EXPANSION JOINTS

- A. Masonry contractor shall provide expansion joints to prevent cracking of masonry work from expansion, contraction, or any other cause. Masonry contractor shall notify architect as to location of joints prior to laying of masonry.
- B. Do not continue horizontal joint reinforcement through control or expansion joints.
- C. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- D. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- E. Size control joints as indicated on drawings; if not indicated, 3/4 inch (19 mm) wide and deep.
- F. Form expansion joint as detailed on drawings.

3.15 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and plates and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. As per manufacturer's recommendations, place minimum of 3 per side (approximately 12" from top and bottom and at center) laid in mortar joints.
 - 2. Fill adjacent masonry cores with grout minimum 12 inches (300 mm) from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.16 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.17 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in McGough Bidding Documents.
- B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
- C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.
- D. Grout Tests: Test each type of grout in accordance with ASTM C 1019, testing with same frequency as masonry samples.

3.18 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Clean and point, as required, the exterior masonry and exposed interior masonry of the building. Mixing and application of cleaner shall be in accordance with the block manufacturer's recommendations. Test panels shall be set up and cleaned using the recommended application and mixtures before the actual cleaning operation is attempted. Under no circumstances shall muriatic acid be allowed on the site without the written approval of the architect.

- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

END OF SECTION

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**SECTION 05 4000
COLD-FORMED METAL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud exterior wall and interior wall framing.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Roof and wall sheathing.
- B. Section 07 2100.10 - Thermal Insulation: Insulation within framing members.
- C. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.
- D. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.
- D. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a.
- E. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (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.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.
- C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- D. Shop Drawings: Indicate component details, framed openings, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Describe method for securing studs to tracks and for bolted framing connections.
 - 2. Calculations for loadings and stresses of specially fabricated framing, signed and sealed by a professional structural engineer.
 - 3. Details and calculations for factory-made framing connectors, signed and sealed by a professional structural engineer.
- E. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

1.06 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing:
 - 1. ClarkDietrich Building Systems: www.clarkdietrich.com.
 - 2. The Steel Network, Inc: www.SteelNetwork.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Framing Connectors and Accessories:
 - 1. Same manufacturer as metal framing.

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. Studs and Track: ASTM C955; studs formed to channel, C- or Sigma-shaped with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Stud Depth: As indicated on drawings.
- B. Header: Engineered one-member assembly, with wide flanges, designed to replace conventional box or nested header framing at openings.
 - 1. Products:
 - a. ClarkDietrich Building Systems; HDS Framing System: www.clarkdietrich.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. 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 gauge, 0.1345 inch (3.42 mm), 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.
 - 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 top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical movement of slab without affecting studs; allow for minimum movement of 3/4 inch (19.05 mm).
 - b. Provide top track with long leg track and head of wall movement connectors; minimum track length of 10 feet (3048 mm).
 - 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.

2.04 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.

2.05 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.01 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Place studs at 16 inches (400 mm) on center; not more than 2 inches (50 mm) from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- C. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- D. Install load-bearing studs full length in one piece. Splicing of studs is not permitted.
- E. Install load-bearing studs, brace, and reinforce to develop full strength and achieve design requirements.
- F. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- G. Install intermediate studs above and below openings to align with wall stud spacing.
- H. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- I. Attach cross studs to studs for attachment of fixtures anchored to walls.
- J. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

END OF SECTION

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**SECTION 05 4300
SLOTTED CHANNEL FRAMING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Continuous slot, bolted metal framing channels and all associated fittings and hardware.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
- B. ASTM A653 - General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot-Dip Process
- C. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)
- D. ASTM F1136 – Standard Specification for Chromium/Zinc Corrosion Protective Coatings for Fasteners
- E. ASTM A907 - Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled, Structural Quality
- F. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- G. MFMA - Metal Framing Manufactureres Association
- H. ANSI/NFPA 70– National Fire Protection Association (National Electrical Code)
- I. AISI - American Iron and Steel Institute

1.04 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in the manufacture of bolted metal framing of the types required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. MFMA Compliance: Comply with the latest revision of MFMA Standards Publication Number MFMA-3, "Metal Framing Standards Publication".
- C. NEC Compliance: Comply with the latest revision NFPA 70 - Article 352 "Surface Metal Raceways and Surface Nonmetallic Raceways".
- D. UL Compliance: Comply with UL "Standard for Surface Metal Raceway and Fittings", UL 5.
- E. 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.
- F. Stainless steel bolted framing parts shall be stamped to identify the material. Material certification sheets and test reports must be made available by the manufacturer upon request.

1.05 SUBMITTALS

- A. Submit drawings of strut and accessories including clamps, brackets, hanger rods, and fittings.
- B. Submit manufacturer's product data and engineered drawings 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).

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver strut systems and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.

- B. Store strut systems and components in original cartons and in clean dry space; protect from weather and construction traffic.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Unistrut Corporation: www.unistrut.com.
- B. Cooper B-Line, Inc.: www.cooperindustries.com.
- C. 80/20 Inc.: www.8020.net.
- D. Substitutions: Equal as approved by the architect.

2.02 STRUT CHANNELS AND COMPONENTS

- A. Steel strut shall be 1-5/8 inches wide in varying heights and welded combinations as required to meet load capacities and designs indicated on the drawings.
- B. Non-ferrous strut shall be 80/20 T-slot aluminum framing system at Rooms 100 & 358 only.
- C. Materials and Finish: Material and finish specifications for each strut type are as follows:
 - 1. Aluminum: Strut shall be manufactured of extruded aluminum alloy 6105-T5. All fittings and hardware shall be zinc plated according to ASTM B633 (SC3 for fittings, SC1 for threaded hardware) for indoor use only. For outdoor use, all fittings and hardware shall be stainless steel Type 304 [Type 316]. [Fittings shall be hot dip galvanized after fabrication in accordance with ASTM 123 with stainless steel Type 304 [Type 316] or chromium zinc ASTM F1136 Gr. 3.]
 - 2. Epoxy Painted: Strut shall be made from steel meeting the minimum mechanical properties of ASTM A1011 SS Grade 33, then painted with water born epoxy applied by a cathodic electro-deposition process. Fittings shall be manufactured from steel meeting the minimum requirements of ASTM A907 SS, Grade 33. All fittings and hardware shall be zinc plated in accordance with ASTM B633 (SC3 for fittings, SC1 for threaded hardware).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install strut in accordance with MFMA-102 'Guidelines for the Use of Metal Framing'; in accordance with equipment manufacturer's recommendations, and with recognized industry practices.
- B. All nuts and bolts shall be tightened to the following values:
- C.

Bolt Size	Torque (ft-lbs)
1. 1/4 - 20	6
2. 5/16 - 18	11
3. 3/8 - 16	19
4. 1/2 - 13	50

END OF SECTION

**SECTION 05 5000
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel and stainless steel items.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 05 1200 - Structural Steel Framing: Structural steel column anchor bolts.
- D. Section 05 2100 - Steel Joist Framing: Structural joist bearing plates, including anchorage.
- E. Section 05 5100 - Metal Stairs.
- F. Section 09 9000 - Painting and Coating: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- E. 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.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- H. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- I. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- J. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- 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.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- B. Installer Qualifications: Use 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 proper performance of the work of this Section.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A500/A500M Grade B cold-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A 53/A 53M Grade B Schedule 40, black finish.
- E. Checker Plate.
- F. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
 - 1. Furnish and install all miscellaneous anchor bolts required as shown on the drawings and as required for proper completion of the building
 - 2. Expansion or toggle bolts
 - 3. Do not fasten to wood plugs set in masonry.
 - 4. Shall be galvanized or painted with asphalt base paint
 - 5. Bolts, screws, etc. for exterior work shall be galvanized.
- G. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- J. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

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. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
 - 1. Grind countersunk heads flush; fill with lead to smooth surface. Cut off screws, bolts flush with nuts or adjacent work; nick threads to prevent loosening.

2.03 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
- B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking, joists, and masonry; prime paint finish.
- C. Lintels: As detailed; prime paint finish.
- D. Other Miscellaneous Items: See drawings for sizes and locations. Including, but not limited to the following:
 - 1. Handrails and guardrails.
- E. Door Frames for Overhead Door Openings and Wall Openings: Bent plate sections and/or angles, as detailed on Drawings; prime paint finish.
- F. Toilet Partition Suspension Members: Steel channel sections and angles; prime paint finish.

2.04 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete and items to be embedded in masonry.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.

2.05 FINISHES - STAINLESS STEEL

- A. Remove blend tool and die marks and stretch lines into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, satin finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Satin: No. 4 finish.
- D. 180-Grit Satin Finish: Oil-ground, uniform, textured finish.
- E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.06 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

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 and aluminum 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.

END OF SECTION

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**SECTION 05 5100
METAL STAIRS & SHIPS LADDER**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with concrete treads.
- B. Stairs with terrazzo treads.
- C. Stairs with grating treads.
- D. Prefabricated or shop fabricated ships ladder.
- E. Structural steel stair framing and supports.
- F. Handrails and guards.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
- B. Section 09 9000 - Painting and Coating: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2014.
- 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; 2012.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- I. 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; 2015.
- J. 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; 2014.
- 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 A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- N. NAAMM AMP 510 - Metal Stairs Manual; 1992, Fifth Edition.
- O. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- P. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
 - 2. Dimensions: As indicated on drawings.
 - 3. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 - 4. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 - 5. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
 - 1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - a. Welded Joints: Continuously welded and ground smooth and flush.
 - b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
 - c. Exposed Edges and Corners: Eased to small uniform radius.
 - d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
 - 2. Service: Exposed joints tight with face surfaces aligned; underside of stair not covered by soffit is not considered exposed to view.
 - a. Welded Joints: Welded on back side wherever possible.
 - b. Welds Exposed to View: Ground smooth; not required to be flush.
 - c. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts or screw threads.
 - d. Metal Surfaces to be Painted: Sanded smooth, suitable for satin or matte finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS (TERRAZZO TREADS WHERE NOTED)

- A. Jointing and Finish Quality Level: Architectural, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill or precast terrazzo treads.
 - 1. Concrete Depth: 1-1/2 inches (38 mm), minimum.
 - 2. Precast Terrazzo Treads: See terrazzo specifications.
 - 3. Tread Pan Material: Steel sheet.
 - 4. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch (1.9 mm) minimum.
 - 5. Concrete Reinforcement: Fibermesh reinforcement, see Section 03 3000 - Cast-in-Place Concrete.

- 6. Concrete Finish: For resilient floor covering.
- D. Risers: Same material and thickness as tread pans.
 - 1. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius. See drawings.
 - 2. Nosing Depth: Not more than 1-1/2 inch (38 mm) overhang.
 - 3. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch (12 mm) wide.
- E. Stringers: Steel tubes or channels as detailed on project drawings.
 - 1. Stringer Depth: As indicated on drawings.
 - 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- F. Landings: Similar construction as treads with concrete fill, supported and reinforced as required to achieve design load capacity.
 - 1. Terrazzo finish where indicated in drawings.
- G. Railings: As detailed on drawings.
- H. Finish: Shop- or factory-prime painted.

2.03 SHIPS LADDERS

- A. Structural steel or aluminum ships ladders as manufactured by Alaco Ladder Co., Model 775H-60 or similar ladders by one of the following:
 - 1. FS Industries.
 - 2. Red River Fabricating, Inc.
 - 3. Approved equal.
- B. Ships ladders shall be designed in accordance with OSHA requirements.
- C. Angle: 60 degree steep incline.
- D. Provide factory welded steel handrails.
- E. Steel Finish: Manufacturer's standard enamel finish.
- F. Aluminum Finish: Mill.
- G. Treads: 36" wide x 6" deep.

2.04 METAL STAIRS WITH GRATING TREADS

- A. Jointing and Finish Quality Level: Service, as defined above.
- B. Risers: Closed.
- C. Treads: Steel bar grating.
 - 1. Grating Type: Welded.
 - 2. Bearing Bar Depth: 3/4 inch (19 mm), minimum.
 - 3. Top Surface: Standard.
 - 4. Nosing: Checkered plate.
 - 5. Nosing Width: 1-1/4 inch (32 mm), minimum.
 - 6. Anchorage to Stringers: End plates welded to grating, bolted to stringers.
- D. Stringers: Rolled steel channels.
 - 1. Stringer Depth: As indicated on drawings.
- E. Railings: Steel pipe railings.
- F. Finish: Galvanized after fabrication.

2.05 HANDRAILS AND GUARDS

- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
 - 1. Outside Diameter: 1-1/4 inch (32 mm), minimum, to 1-1/2 inches (38 mm), maximum.
- B. Guards:
 - 1. Top Rails: See drawings for details.
 - 2. Infill at Cable Railings: Cable railing system
 - a. Cable: ASTM A 555/555M.
 - 1) Fabricate from ASTM A666 stainless steel, Type 316.

- 2) Size: 3/16 inch (5mm) diameter.
- b. Fasteners: Stainless Steel.
- 3. End Posts: Same material as top rails; see drawings for sizing.
 - a. Horizontal Spacing: As indicated on drawings.
 - b. Mounting: Welded to top surface of stringer.
- 4. Intermediate Posts: Provide single and double king posts as indicated on drawings.
 - a. Mounting: Welded to top surface of stringer.

2.06 MATERIALS

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
- C. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.
- D. Pipe: ASTM A 53/A 53M Grade B Schedule 40, black finish.
- E. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
 - 1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
 - 2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
- F. Concrete Fill: Type specified in Section 03 3000.

2.07 ACCESSORIES

- A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
- B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, and comply with VOC limitations of authorities having jurisdiction.

2.08 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop- and touch-up primer.
 - 1. Preparation of Steel: In accordance with SSPC-SP 2 Hand Tool Cleaning.
 - 2. Number of Coats: One.
- D. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
 - 1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Obtain approval prior to site cutting or creating adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- H. Install ships ladders in accordance with manufacturer's recommendations.

END OF SECTION

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**SECTION 06 1000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rough opening framing for doors, windows, and roof openings.
- B. Roof-mounted curbs.
- C. Roofing nailers.
- D. Fire retardant treated wood materials.
- E. Communications and electrical room mounting boards if not provided by electrical contractor.
- F. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

- A. Section 06 2000 - Finish Carpentry.
- B. Section 06 4100 - Millwork.
- C. Section 10 2601 Wall Graphics and Corner Guards: Backing for Wall Graphic.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- D. PS 1 - Structural Plywood; 2009.
- E. PS 20 - American Softwood Lumber Standard; 2010.
- F. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber; 2000.
- G. SPIB (GR) - Grading Rules; 2014.
- H. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2004, and supplements.
- I. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.06 QUALITY ASSURANCE

- A. Manufacture Qualifications: Products used in the work of this Sections shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful productions acceptable to the Architect.
- B. Installer Qualifications: Use 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 proper performance of the work of this section.
- C. Source Limitations:

1. Single-Source Responsibility for Engineered Wood Products: Obtain each type of engineered wood product from one source and by a single manufacturer
 2. Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by a single producer.
- D. Listing and Labeling:
1. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1.07 WARRANTY

- A. One year from date of completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
1. Species: Spruce-Pine-Fir, unless otherwise indicated.
 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: Kiln-dry or MC15.
- D. Stud Framing (2 by 2 through 2 by 6 (50 by 50 mm through 50 by 150 mm)):
1. Species: Any allowed under referenced grading rules.
 2. Grade: No. 1.

2.03 CONSTRUCTION PANELS

- A. Wall Sheathing: APA PRP-108, Structural I Rated Sheathing, Exterior Exposure Class, and as follows:
1. Span Rating: 24/0 (610/0).
 2. Thickness: As indicated in drawings.
- B. Other Applications:
1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, CDX Plugged or better, Exterior grade.
 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 3. Other Locations: PS 1, C-D Plugged or better.
 - a. Ps 1, A-A, interior grade to be used if both sides are exposed.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
- B. Fire Retardant Treatment:
 - 1. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated .
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific non-structural framing and blocking:
 1. Cabinets and shelf supports.
 2. Wall brackets.
 3. Handrails.
 4. Grab bars.
 5. Towel and bath accessories.
 6. Wall-mounted door stops.
 7. Tack boards and marker boards.
 8. Wall paneling and trim.
 9. Joints of rigid wall coverings that occur between studs.
 10. Mounting brackets and screens.
 11. Other miscellaneous locations not listed above.

3.04 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.
- C. Wood blocking & plywood at roof/wall interface.

3.05 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
 1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.
- B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 3. Install adjacent boards without gaps.
 4. Size and Location: As indicated on drawings.

3.06 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet (1 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.07 INSTALLATION OF OWNER SUPPLIED ITEMS

- A. Install all items as so noted in the project drawings and not installed under Finish Carpentry Work. Work shall include unloading and storing of all items shipped F.O.B. jobsite, to prevent from theft and/or damage.
- B. Provide blocking for all Owner supplied items.
- C. All installation work shall be in accordance with manufacturer's recommendations.
- D. See specification sections for information regarding the items that will be furnished under separate bid package.

- E. Owner supplied items to be installed by General Work and Labor Contractor include but are not limited to manually operated projection screens, and paper towel, toilet paper and soap dispensers. See drawings.

3.08 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 7000.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

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**SECTION 06 2000
FINISH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Custom Accent Wood Veneer Paneling.
- C. Custom Wood Frames.
- D. Concealed Clip Hangers.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 4100 - Millwork: Shop fabricated custom cabinet work.
- C. Section 06 4200 - Wood Paneling: Shop fabricated custom paneling.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with 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. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide instructions for attachment hardware and finish hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- D. Samples: Submit two samples of finish plywood, 6 inch x 6 inch in size illustrating wood grain and specified finish.
- E. Samples: Submit two samples of wood trim 6 inches long.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect from moisture damage.
- B. Do not deliver interior finish carpentry until environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

- C. Interior Woodwork Items:
 - 1. Accent Wood Veneer Paneling with Aluminum Trims at Entry Portals (WDP-1).
 - a. Finish: Rift Cut White Oak, stained to match custom sample.
 - b. Edges: Veneer to wrap all exposed edges.
 - c. Substrate: 3/4" Plywood.
 - d. Size: Varies, see drawings.
 - e. Locations: Entry Portals, refer to drawings.
 - 2. Accent Wood Veneer Paneling at Donor Wall (WDP-2).
 - a. Finish: Rift Cut White Oak, stained to match existing.
 - b. Edges: Veneer to wrap all exposed edges.
 - c. Substrate: 3/4" Industrial Board.
 - d. Size: Refer to drawings.
 - e. Locations: FLC Donor Wall.
 - 3. Wood Frame (WD-2).
 - a. Finish: Poplar Wood, painted.
 - b. Frame: Miter corners.
 - c. Locations: Frame at all wall graphic locations, refer to drawings.

2.02 SHEET MATERIALS

- A. Hardwood Plywood: Face species White Oak, rift cut, book matched, veneer core; HPVA HP-1 Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.
- B. Particleboard: ANSI A208.1 Composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders; of grade to suit application; sanded faces.

2.03 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Fasteners: Of size and type to suit application; stainless steel finish in concealed locations and stainless steel finish in exposed locations.

2.04 ACCESSORIES

- A. Aluminum Edge Trim: Extruded 'C' or 'U' shape; smooth surface finish; self locking serrated tongue; of width to match component thickness or as detailed in the Drawings; clear anodized finish.
- B. Wood Filler: Solvent base, tinted to match surface finish color.
- C. Attachment Accessories: Concealed Clip Hangers.
 - 1. Manufacturers:
 - a. Basis of Design: Monarch Metal Fabrication, Product: Easy Wall Panel System; www.monarchmetal.com.
 - b. Wall Panel Systems, Inc.: www.wallpanelsystems.net.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. System Description: Two piece interlocking assembly, similar to a french cleat, designed for removable installation of wall panels and other panels without exposed fasteners. System consists of 2 parts with the shorter Z clips mechanically attached to back of panel and the longer continuous length attached to wall substrate.
 - a. Material: Extruded 6063-T6 aluminum in accordance to ASTM B 221; mill finish.
 - b. Components: See drawings and joint details on sheet A5.11.
- D. Aluminum Trim at Wood Veneer Paneling:
 - 1. Aluminum Trim (TR-2):
 - a. Basis of Design Product: Fry Reglet - Z-Reveal DRMZ-2
 - b. Finish: Anodized, Buffed Brite Black.
 - c. Application: Perimeter Reveal Trim.
 - d. Note: Extended Lead Times, plan accordingly.
 - 2. Aluminum Trim (TR-3):

- a. Basis of Design Product: Fry Reglet - Millwork Reveal L-Angle MWRL100.
- b. Finish: Anodized, Buffed Brite Black.
- c. Application: Trim at outside edges.
- 3. Aluminum Trim (TR-5):
 - a. Basis of Design Product: Fry Reglet, Millwork Reveal Outside Corner MWROSC100.
 - b. Finish: Anodized, Buffed Brite Black.
 - c. Application: Outside Corner Trim.

2.05 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Shop prepare and identify components for book match grain matching during site erection.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.06 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 1, Lacquer, Nitrocellulose.
 - b. Stain: As selected by Architect.
 - c. Sheen: Flat.
- E. Back prime woodwork items to be field finished, prior to installation.

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) or AWMAC/WI (NAAWS) 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 (0.79 mm). Do not use additional overlay trim to conceal larger gaps.
- D. Install components with nails at 16 inch on center (nails at 400 mm on center).
- E. Concealed Clip Hangers: Install products level and plumb, in full compliance with manufacturer's installation instructions.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

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**SECTION 06 4100
MILLWORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Countertops.
- C. Hardware.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- C. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
- D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Show location of each item, dimensioned plans and elevations, large scale details, attachment devices, and other components.
- C. Product Data: Provide data for hardware accessories.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of experience.
 - 1. Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- B. Installer Qualifications: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the methods needed for proper performance of the work of this section.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.
- B. Do not deliver woodwork until painting and similar operations that could damage soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified.
- C. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.

1.07 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Custom Grade.

- B. Cabinets:
 - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
 - 2. Finish - Exposed Interior Surfaces: Decorative laminate.
 - 3. Finish - Concealed Surfaces: Melamine.
 - 4. Edge Profiles: Plastic edge banding; thickness as indicated under Accessories.
 - 5. Casework Construction Type: Type A - Frameless.
 - 6. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.
 - 7. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
 - a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.
 - 8. Adjustable Shelf Loading: 50 lbs. per sq. ft.
 - 9. Toe Base:
 - a. Shall be either separate from or integral to the cabinet body at the manufacturer's option.
 - 1) Separate bases shall be mechanically fastened to the cabinet bottom at the factory.
 - b. Construction:
 - 1) Manufacturer's option.
 - 2) Material thickness shall be at least 3/4 inch.
 - 3) Sleepers shall be provided at a maximum of 36 inches (86.4 mm) on center.
 - c. Height: 4 inches unless otherwise detailed on drawings.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 6000.

2.03 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Arborite: www.arborite.com.
 - 2. Formica Corporation: www.formica.com.
 - 3. Panolam Industries International, Inc: www.nevamar.com.
 - 4. Wilsonart, LLC: www.wilsonart.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Plastic Laminate Schedule:
 - 1. Casework
 - a. Option 1:
 - 1) LAM-1: Formica; Aged Ash 8844, WR Woodbrush finish; Application: Typical casework.
 - 2) LAM-2: Formica, Black 909-58, Matte Finish.; Application: Work cafe casework, Decorative panels at student lounge, Reflection Space casework, Toilet room casework.
 - b. Option 2:
 - 1) LAM-1: Wilsonart, Norwegian Ash 8241-38, Fine Velvet finish.
 - 2) LAM-2: Wilsonart, Black 1598-05.

2.04 SOLID SURFACE MATERIALS

- A. Manufacturers:
 - 1. Dupont: www.corian.com.
 - 2. Corian: www.corian.com.
 - 3. Avonite Surfaces: www.avonitesurfaces.com.
 - 4. Wilsonart International, Inc.: www.wilsonart.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

- B. Solid Surfacing and Plastic Resin Castings: Complying with ISSFA-2 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.
 - 1. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E 84.
 - 2. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - 3. NSF approved for food contact.
- C. Solid Surface Schedule:
 - 1. Option 1:
 - a. SSF-1: Corian, Silver Birch; Location: Window Sills.
 - b. SSF-2: Corian, Sparkling White; Location: Typical Solid Surface Countertops.
 - c. QTZ-1: Diresco, UV Quartz - Terrazzo White, YU002 Polished finish; Location: Countertops at Dean's Suite, Work Cafe, and Toilet Rooms.
 - d. QTZ-2: Caesarstone, Quartz - Fresh Concrete 4001; Location: Typical Quartz Countertops.
 - 2. Option 2:
 - a. SSF-1: LX Hausys, Ripe Cotton G518R.
 - b. SSF-2: LX Hausys, Strato Wind Z003.
 - c. QTZ-1: Wilsonart, Lyra Q2001.
 - d. QTZ-2: Wilsonart, Arashi 4011.

2.05 COUNTERTOPS & SILLS

- A. Solid Surface Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/2 inch (12 mm), minimum.
 - 2. Back and End Splashes: Same sheet material, square top; minimum 4 inches (102 mm) high.
 - 3. Skirts: As indicated on drawings.
 - 4. Plywood for Supporting Substrate: PS 1 Exterior Grade with preservative treatment, AC veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
 - 5. Solid Surface Window Sills:
 - a. Profile: 1/2" thick with 1-1/2" nosing as shown on drawings.
 - 6. Other Solid Surface Components:
 - a. Thickness: 1/2" minimum, unless otherwise noted on drawings.
- B. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
 - 1. Flat Sheet Thickness: 3/4 inch (19 mm), minimum.
 - 2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic 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. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with the MIA Dimension Stone Design Manual.
 - b. Finish on Exposed Surfaces: Polished.
 - 3. Other Components Thickness: 3/4 inch (19 mm), minimum.
 - 4. Miter all edge profiles.
 - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches (102 mm) high.

2.06 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.

- B. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; of width to match component thickness.
 - 1. Color: As selected by Architect from manufacturer's standard range.
 - 2. Thickness:
 - a. Door & Drawer Edges: 3 mm.
 - b. Concealed Interior Cabinet Box Edges: 1 mm.
 - c. Exposed Shelf Edges: 3 mm.
 - d. Exposed Interior Box Edges: 3 mm.
 - 3. Product: Doellken Accent Edge PVC edge banding, Canplast, Charter Industries, Rehau, or approved equal.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- D. Grommets: Standard plastic or stainless steel grommets for cut-outs, in colors to be selected by Architect.
 - 1. Round Plastic Grommets: TG Series, 2" inside diameter by Doug Mockett & Co, Inc. or equal.
 - a. Provide (1) grommet per 3'-0" of countertop or for each seating space. Verify locations with architect.
 - 2. Trash Grommets: See drawings for manufacturer, size, and product number.
- E. Coat Rods: 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.
- F. File Suspension System: Extruded molding integral with top of drawer sides to accept standard hanging file folders.
- G. Support Brackets: Furniture grade, epoxy powder coated steel.
 - 1. For 24" deep countertops: Model AM 1824 B as manufactured by A & M Hardware.
 - 2. For 30" deep countertops: Model AM 1824 B as manufactured by A & M Hardware.
 - 3. Where concealed, Concealed countertop support brackets by Centerline Brackets, www.countertopbracket.com. Color as noted on drawings.
- H. Metal Trim (TR-6): Anodized Aluminum Trim, 90 Degree Outside Corner Channel ALU5116-BK as manufactured by Outwater Industries, or equal.
 - 1. Application: All outside laminate corners at custom desking.
 - 2. Finish: Black.

2.07 HARDWARE

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Finish millwork hardware shall be dull chrome, aluminum, stainless steel, i.e. silver rather than bronze finish.
- C. Adjustable Casework Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, standard finish, for nominal 2 inch (50 mm) spacing adjustments.
- D. Adjustable Wall Shelf Supports: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, satin chrome finish, for nominal 1 inch (25 mm) spacing adjustments.
 - 1. Product: Heavy duty series 87 standards and 187 brackets manufactured by Knappe and Vogt Manufacturing Company or equal.
 - 2. Spacing shall be at 16" o.c.
- E. Countertop Support Brackets: Fixed, L-shaped, face-of-stud mounting.
- F. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 5 inch centers ("U" shaped wire pull, steel with satin finish, 127 mm centers).
 - 1. Product: Studio 917, Cityscape Collection Pull, 5" Matte Black manufactured by Holdahl.

- G. Drawer Slides:
 - 1. Static Load Capacity: As scheduled.
 - a. Regular, kneespace and pencil: 100-pound load rate epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature. Paper storage, 150-pound load rated epoxy coated steel slides.
 - b. File: Full extension, 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.
 - 2. Features: Provide self closing/stay closed type.
 - 3. Manufacturers:
 - a. Grass America Inc: www.grassusa.com.
 - b. Knap & Vogt Manufacturing Company: www.knapeandvogt.com.
 - c. Blum, Inc; www.blum.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- H. Hinges: European style concealed self-closing type, steel with polished finish.
 - 1. Doors 48" and over in height have 3 hinges per door.
 - 2. Manufacturers:
 - a. Grass America Inc: www.grassusa.com.
 - b. Hardware Resources: www.hardwareresources.com.
 - c. Blum, Inc: www.blum.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- I. Locks (Provide locks where indicated in drawings):
 - 1. Locks shall be removable core type Advantage Plus 5 pin dead bolt locks by CompX National or approved equal.
 - 2. Automatic door bolt, Hafele #530-1604, use to secure inactive door on all locked cabinets.
- J. Sliding Door Track Assemblies: Upper and lower track of satin anodized aluminum, with matching shoe equipped with nylon rollers.

2.08 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
- E. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.09 COUNTERTOP FABRICATION

- A. Fabricate in accordance with quality standard specified for cabinets.
- B. Fabricate tops and splashes in the largest section 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 (25 mm) 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.
- C. 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 (102 mm), unless otherwise indicated.
- D. Solid Surfacing: Fabricate tops up to 144 inches (3657 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- E. Wall-Mounted Counters: Provide skirts and aprons as indicated on drawings, finished to match.

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.

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
 1. Miter joints shall be clean and true, the entire visible surface shall be sanded parallel with the grain of the wood.
 2. Butting spaces shall be finished smooth.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.
 1. Install with minimum number of joints practical, using pieces from maximum lengths of product. Do not use pieces less than 24 inches (610 mm) long, except when necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness joints, if required.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim for this purpose.
- E. Secure cabinets and counter bases to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- G. Protect all millwork against the elements and damage in handling, construction, etc. The contractor will be liable for any such damage. All finish casing or trim that is applied to flat surfaces shall be hollowed out on the back 1/16" to within 1/2" of each edge. Saw Kerf the back of all pieces where necessary to prevent warping.
- H. Miscellaneous Items:
 1. Finish hardware: all cabinet hardware such as hinges, guides catches, pulls, shelf brackets, cabinet locks, etc., shall be furnished and installed under this section. Hinges shall be located as follows:
 - a. Top hinge: On doors more than 18" in height, position top of hinge 3" below top of door.
 - b. Bottom hinge: On doors more than 18" in height, position bottom of hinge 3" above bottom of door.
 - c. Intermediate hinge: Equal spacing between top and bottom hinges. Provide intermediate hinge on all doors 48" or more in height.
 - d. On doors 18" or less in height, mount top and bottom hinges at locations shown or as directed.
 2. All cabinet hardware that will hinder the painter in finishing the cabinets shall be removed and tagged as to location and stored to allow the painter to properly finish the cabinetwork. After the finishing is complete the hardware shall be reinstalled and left in a first-class condition.
 3. Millwork: All cabinet work, counters, window trim, etc., shall be as detailed on the drawings. The workmanship of fabrication and erection shall be cabinet work, not joiner or carpenter work. All joints shall be glued. All surfaces not exposed to view may be any

material that is suitable for the purposes intended. All work shall be completely fabricated in the shop, then disassembled, with each section clearly marked for location, for shipment and installation on the job site.

- I. All millwork shall be provided with cleats on the backs of cabinets for anchoring. All cabinets shall be furnished with attachment bases.
- J. 1/4" tack board shall be applied to 1/4" masonite board prior to being sent to the job site. Any corkboard that does not adjoin a wall or cabinet shall have a plastic laminate trim piece applied at the job site. All tacking surfaces attached to or part of the millwork cabinet work shall be applied by the Millwork Contractor.
- K. Field drill holes for grommets in countertops for electrical and telephone cords. Verify locations of holes with Architect.
- L. Cover bottom edges of all drawer fronts, counter skirts etc. at knee spaces with plastic laminate to provide a smooth surface that will minimize snagging of staff clothing.
- M. Coordinate work with work included under Section 06 1000 - Rough Carpentry.
- N. Countertops will be field cut for sinks.
- O. Fit all cabinets, countertops, shelving, etc., tightly to walls and/or floors as may be the case. Installation of millwork shall include cutting of countertops for sinks. Check locations and sizes with plumber. After millwork is in place, adjust doors and drawers as required for proper operation and alignment. Final adjustment of hinges shall include the installation of the adjustment screws for each hinge.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

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

END OF SECTION

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**SECTION 06 4200
WOOD PANELING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Laminate wood paneling.
- B. Aluminum Trim Pieces.
- C. Concealed Clip Hangers.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Grounds and concealed blocking.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2009.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.
- B. Do not deliver wood materials to project site until building is fully enclosed and interior temperature and humidity are in accordance with recommendations of AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

PART 2 PRODUCTS

2.01 PANELING

- A. Laminate Paneling:
 - 1. Option 1:
 - a. (LAM-1): Formica, Aged Ash 8844-WR.
 - b. (LAM-2): Formica, Black 909-58.
 - 2. Option 2:
 - a. (LAM-1): Wilsonart, Norwegian Ash 82
 - b. (LAM-2): Wilsonart, Black 1595-05.
 - 3. Panels: Graining to run vertical at all locations.
 - 4. Substrate: 3/4" Industrial Board.
 - 5. Visible Edges and Reveals: .020" Edgebanding Tape to match laminate.

2.02 ACCESSORIES

- A. Attachment Accessories: Concealed Clip Hangers.
 - 1. Manufacturers:
 - a. Basis of Design: Monarch Metal Fabrications, Product: Easy Wall Panel System; www.monarchmetal.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. System Description: Two piece interlocking assembly, similar to a french cleat, designed for removable installation of wall panels and other panels without exposed fasteners. System consists of 2 parts with the shorter Z clips mechanically attached to back of panel and the longer continuous length attached to wall substrate.
 - a. Material: Extruded 6063-T6 aluminum in accordance to ASTM B 221; mill finish.

- b. Components: See drawings and joint details on sheet A5.10.
- B. Aluminum Trim Pieces:
 1. Aluminum Trim (TR-1): Fry Reglet - Reveal Base DRMB-625-400.
 - a. Finish: Anodized, Buffed Brite Black.
 - b. Application: Reveal Base at panel walls.
 2. Aluminum Trim (TR-2): Fry Reglet - Z-Reveal DRMZ-25-25.
 - a. Finish: Anodized, Buffed Brite Black.
 - b. Application: Perimeter Reveal Trim at panels.
 - c. Note: Extended lead times, plan accordingly.
 3. Aluminum Trim (TR-3): Fry Reglet - Millwork Reveal L-Angle MWRL100.
 - a. Finish: Anodized, Buffed Brite Black.
 - b. Application: Trim at outside panel edges.
 4. Aluminum Trim (TR-4): Fry Reglet - L1 Millwork Mid F9 LED-MWR10050.
 - a. Finish: Anodized, Buffed Brite Black.
 - b. Application: LED Reveal Trim.
 5. Aluminum Trim (TR-5): Fry Reglet - Millwork Reveal Outside Corner MWROSC100.
 - a. Finish: Anodized, Bufed Brite Black.
 - b. Application: Outside corner trim at panel edges.

2.03 WOOD-BASED MATERIALS - GENERAL

- A. Wood fabricated from old growth timber is not permitted.
- B. Hardwood Plywood: HPVA HP-1 Grade A; veneer core, type of glue recommended for application; of grain quality suitable for transparent finish.
- C. Particleboard: Composed of wood chips, medium density, with waterproof resin binders; of grade to suit application; sanded faces; complying with ANSI A208.1.
- D. Lumber: Maximum moisture content of 6 percent; with vertical grain , of quality suitable for transparent finish.

2.04 ADHESIVES AND FASTENERS

- A. Adhesives: Type suitable for intended purpose, complying with applicable air quality regulations.

2.05 FABRICATION

- A. Prepare panels for delivery to site, permitting passage through building openings.
- B. Finish exposed edges of panels as specified by grade requirements.

2.06 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 that field measurements are as indicated on shop drawings.
- B. Verify adequacy of backing and support framing.
- C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Do not begin installation until wood materials have been fully acclimated to interior conditions.
- C. Set and secure materials and components in place, plumb and level, using concealed fasteners wherever possible.

- D. Touch up damaged finish to match original, using materials provided by fabricator; replace components that cannot be refinished like new.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.8 mm).

END OF SECTION

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**SECTION 06 8316
FIBERGLASS REINFORCED PANELING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass reinforced plastic panels.

1.02 REFERENCE STANDARDS

- A. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Samples: Submit two samples 2 by 2 inch (50.8 by 50.8 mm) in size illustrating material and surface design of panels.

1.04 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. Fiberglass Reinforced Plastic Panels:
 - 1. Crane Composites, Inc: www.cranecomposites.com.
 - 2. Marlite, Inc: www.marlite.com.
 - 3. Panolam Industries International, Inc: www.panolam.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANEL SYSTEMS

- A. Wall Panels (FRP-1): Standard FRP, as manufactured by Marlite, or equal.
 - 1. Panel Size: 4 by 8 feet (1.2 by 2.4 m).
 - 2. Panel Thickness: 0.09 inch (2.3 mm).
 - 3. Style: Pebbled.
 - 4. Color: As selected by Architect from manufacturer's full range of colors.
 - 5. Attachment Method: Adhesive only, sealant joints, no trim.

2.03 MATERIALS

- A. Panels: CLASS A, Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
 - 1. Surface Burning Characteristics: Maximum flame spread index of 25 or less and smoke developed index of 450 or less; when system tested in accordance with ASTM E84.
- B. Adhesive: Type recommended by panel manufacturer.
- C. 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 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. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- G. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

**SECTION 07 1300
SHEET WATERPROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheet Waterproofing: Self-adhered sheet membrane waterproofing at basement & elevator pit walls where indicated on drawings.
- B. Precon membrane under the elevator pit slab.
- C. Drainage Board and Accessories, at basement & elevator pit walls.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000-Unit Masonry: Concrete Masonry substrate.

1.03 REFERENCE STANDARDS

- A. ASTM D146 - Standard Test Methods for Sampling and Testing Bitumen-Saturated Felts and Fabrics Used in Roofing and Waterproofing.
- B. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).
- C. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- D. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting; 2012.
- E. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds; 1998 (Reapproved 2010).
- F. ASTM D1876 - Standard Test Method for Peel Resistance of Adhesives (T-Peel Test); 2008.
- G. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- H. ASTM D5385/D5385M - Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes; 1993 (Reapproved 2014).
- I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- J. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2013).
- K. NRCA (WM) - The NRCA Waterproofing Manual; 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for membrane, flexible flashings, joint cover sheet, and joint and crack sealants.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Membrane 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.

1.06 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application and until liquid or mastic accessories have cured.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.
- C. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.01 WATERPROOFING APPLICATIONS

- A. Self-Adhered Modified Bituminous Sheet Membrane:
 - 1. Location: Basement Foundation Walls and Elevator Pit.
 - 2. Cover with drainage panel.

2.02 MEMBRANE MATERIALS

- A. Self-Adhered Modified Bituminous Sheet Membrane:
 - 1. Thickness: 60 mil, 0.060 inch (1.5 mm), minimum.
 - a. Carrier Film: 4 mils
 - b. Polymeric Membrane: 56 mils
 - 2. Sheet Width: 38.5 inches (1 m), minimum.
 - 3. Tensile Strength:
 - a. Film: 5000 pounds per square inch (34.57 MPa), minimum, measured according to ASTM D882 and at grip-separation rate of 2 inches (50 mm) per minute.
 - b. Membrane: 325 pounds per square inch (2.24 MPa), minimum, measured according to ASTM D412 Method A, using die C and at spindle-separation rate of 2 inches (50 mm) per minute.
 - 4. Elongation at Break: 300 percent, minimum, measured according to ASTM D412.
 - 5. Water Vapor Permeance: 0.05 perm (2.9 ng/(Pa s sq m)), maximum, measured in accordance with ASTM E96/E96M.
 - 6. Low Temperature Flexibility: Unaffected when tested according to ASTM D1970/D1970M at minus 20 degrees F (minus 11 C), 180 degree bend on 1 inch (25 mm) mandrel.
 - 7. Peel Strength: 7 pounds per inch (1226 N/m), minimum, when tested according to ASTM D903.
 - 8. Lap Adhesion Strength: 5 pounds per inch (875.6 N/m), minimum, when tested according to ASTM D1876.
 - 9. Puncture Resistance: 50 pounds (22.67 kg), minimum, measured in accordance with ASTM E154/E154M.
 - 10. Water Absorption: 0.1 percent increase in weight, maximum, measured in accordance with ASTM D570, 24 hour immersion.
 - 11. Hydrostatic Resistance: Resists the weight of 200 feet (61 m) when tested according to ASTM D5385/D5385M.
 - 12. Manufacturers:
 - a. Carlisle Coatings & Waterproofing Inc; MiraDRI 860/861: www.carlisleccw.com.
 - b. Grace Construction Products; product: Bithuthene 3000. www.na.graceconstruction.com.
 - c. Henry Company; Blueskin WP 200: www.henry.com.
 - d. W.R. Meadows, Inc; MEL-ROL: www.wrmeadows.com.
 - e. Polyguard 650.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- B. Termination Bars: High strength plastic strip designed to support PRECON and MEL-DRAIN at the top of wall termination point; compatible with membrane and adhesives.
- C. Adhesives: As recommended by membrane manufacturer.

2.03 ACCESSORIES

- A. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.
- B. Protection/Drainage Board: MEL-DRAIN Drainage Board, by W.R. Meadows (or approved equal).
- C. Cant Strips: Premolded composition material.
- D. Flexible Flashings: Detail Strip (Cant Strip) 9 inch wide, 65 mil. thick, self-adhering elastomeric tape by W.R. Meadows, at inside and outside corners and between walls and footings.
- E. Surface Conditioner/Primer: _____, compatible with membrane.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.
- C. Verify items that penetrate surfaces to receive waterproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces from damage not designated to receive waterproofing.
- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.
- C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.
- D. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.
- E. Seal moving cracks with sealant and non-rigid filler, using procedures recommended by sealant and waterproofing manufacturers.
- F. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.
- G. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate according to ASTM D5295/D5295M.

3.03 INSTALLATION - MEMBRANE

- A. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- B. Roll out membrane, and minimize wrinkles and bubbles.
- C. Self-Adhering Membrane: Remove release paper layer, and roll out onto substrate with a mechanical roller to provide full contact bond.
- D. Overlap edges and ends, minimum 3 inches (76 mm), seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.
- E. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.
- F. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.
- G. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings. Install Detail Strip prior to the waterproofing membrane, and overlap the waterproofing membrane on top of the vertical leg of the strip.
- H. Extend membrane over cants and up intersecting surfaces at membrane perimeter minimum 6 inches (150 mm) above horizontal surface for first ply and 6 inches (150 mm) at subsequent plies laid in shingle fashion.
- I. Seal membrane and flashings to adjoining surfaces.
 - 1. Install termination bar along edges.

2. Install counterflashing over exposed edges.

3.04 INSTALLATION - DRAINAGE PANEL

- A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward. Scribe and cut boards around projections, penetrations, and interruptions.
- B. Adhere drainage panel to substrate with compatible adhesive.

3.05 PROTECTION

- A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION

**SECTION 07 2100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall and exterior wall behind metal wall finish (previously bid).
- B. Board insulation at cavity wall construction, and exterior wall behind metal panel.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete Contractor shall supply and install foundation insulation as specified in this section.
- B. Section 04 2000 - Unit Masonry: Masonry Contractor shall supply and install cavity wall insulation; as well as, mineral fiber batt insulation at top of CMU walls between flutes of steel decking specified in this section.
- C. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.

1.03 REFERENCE STANDARDS

- A. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- E. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- G. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- H. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation at Perimeter of Foundation: Extruded polystyrene board.
- B. Insulation Inside Masonry Cavity Walls: Composite Polyisocyanurate (CPI) Board Insulation Faced with Plywood.

- C. Insulation Over Metal Stud Framed Walls, Continuous: Composite Polyisocyanurate (CPI) Board Insulation Faced with Plywood.
- D. Insulation Over Metal Stud Framed Walls, Continuous at Contractor's Option with Imetco Metal Panel for E1 & E2 Wall Types: Mineral Fiber Board.
- E. Insulation at top of steel stud walls between flutes of steel decking and around structural penetrations: Mineral fiber batt. Top of wall insulation and insulation around structural penetrations shall be supplied and installed by the Drywall Contractor.
- F. Insulation around Wall Penetrations: Mineral fiber batt. Insulation around wall penetrations shall be provided and installed by the respective contractor.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.0 (0.88) per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
 - 4. R-Value: Minimum 5.4 R per inch of material at 40 degrees F per ASTM C518 of thickness shown on drawings.
 - 5. Compressive Resistance: 25 psi (173 kPa) typical. Provide 50 psi minimum at underslaloations.
 - 6. Manufacturers:
 - a. Dow Chemical Company: www.dowbuildingsolutions.com/#sle.
 - b. Kingspan Insulation LLC: www.kingspan.com/#sle.
 - c. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - d. Amoco Forum Products, Co
 - e. Diversifoam Products
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- B. Composite Polyisocyanurate (CPI) Board Insulation Faced with Plywood: Rigid cellular foam, complying with ASTM C1289 Type V made with Type II Clas 2 foam.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - a. Incorporate Exposure 1 Fire Treated Plywood with flame spread of <25 per ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Complies with fire resistance requirements specified as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - 4. Board Size: 48 inch by 96 inch (1220 mm by 2440 mm).
 - 5. Plywood Thickness: 5/8 inch (16 mm).
 - 6. Insulation Board Thickness: 3 inch (76 mm).
 - 7. Board Edges: Square.
 - 8. Manufacturers:
 - a. Atlas Roofing Corporation: www.atlasroofing.com/#sle.
 - b. Hunter Panels; Xci Ply: www.hunterpanels.com/#sle.
 - 9. Substitutions: See Section 01 6000 - Product Requirements.

2.03 FIBERBOARD INSULATION MATERIALS

- A. Mineral Fiberboard Insulation: Rigid or semi-rigid mineral fiber, ASTM C612 or ASTM C553; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 - 1. Where indicated, provide fiberglass reinforced polypropylene facing on one side; with flame spread index of 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 - 3. Board Size: 16 by 48 inches (405 by 1220 mm).
 - 4. Board Thickness: 3 inches (76 mm).
 - 5. Thermal Resistance: R-value (RSI-value) of 5.0 min. (per inch).

6. Manufacturers:
 - a. Johns Manville: www.jm.com/#sle.
 - b. ROCKWOOL (ROXUL, Inc): www.rockwool.com/#sle.
 - c. Thermafiber, Inc: www.thermafiber.com/#sle.
7. Substitutions: See Section 01 6000 - Product Requirements.

2.04 BATT INSULATION MATERIALS

- A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 2. Manufacturers:
 - a. Johns Manville: www.jm.com.
 - b. Knauf Insulation: www.knaufinsulation.com.
 - c. ROCKWOOL (ROXUL, Inc): www.rockwool.com.
 - d. Thermafiber, Inc: www.thermafiber.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

2.05 ACCESSORIES

- A. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- B. Foamed-in-Place Insulation: ASTM C 1029, Type II, expanding polyurethane foam insulation intended for filling small voids. Apply to provide a complete continuous seal at cavity wall insulation, and all other concealed voids of all types, shapes and sizes.
- C. Adhesive: Type recommended by insulation manufacturer for application.

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 FOUNDATION PERIMETER

- A. Install according to manufacturer's written instructions.
- B. Install boards horizontally on foundation perimeter.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Apply adhesive to back of boards:
 1. Three continuous beads per board length.
 2. Compatible with waterproofing.
- B. Install rigid insulation directly to steel studs or exterior grade sheathing at 16 inches (406 mm) on center with manufacturer recommended mechanical fasteners, and seal joints with manufacturer's recommended foam.
- C. Install boards horizontally on walls.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
 1. Cover exterior surface of foundation wall completely from footing top up to the height indicated on the drawings.
- E. Fit snugly between wall ties at masonry cavity walls.

3.04 BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.

- B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- C. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.05 PROTECTION

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

END OF SECTION

**SECTION 07 2500
WEATHER BARRIERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vapor Retarders: Materials to make exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls water vapor resistant and air tight.
- B. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.
- B. Section 09 2116 - Gypsum Board Assemblies: Installation of vapor retarders and air barriers, unless noted otherwise.

1.03 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
 - 1. Water Vapor Permeance: For purposes of conversion, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$.

1.04 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 E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- D. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics, performance criteria, and limitations.
- C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air Barrier Sheet, Self-Adhered:
 - 1. Air Permeance: $0.004 \text{ cfm}/\text{sq ft}$ ($0.02 \text{ L}/(\text{s sq m})$), maximum, when tested in accordance with ASTM E2178.
 - 2. Water Vapor Permeance: 29 perms ($1658 \text{ ng}/(\text{Pa s sq m})$), minimum, when tested in accordance with ASTM E96/E96M Procedure A (Desiccant Method) at 73.4 degrees F (23 degrees C).
 - 3. Water Penetration Resistance Around Nails: Pass, when tested in accordance with ASTM D1970/D1970M (modified).

4. Complies with NFPA 285 wall assembly requirements.
5. Manufacturers:
 - a. Henry Company; Blueskin VP160: www.henry.com/#sle.
 - b. VaproShield, LLC; RevealShield SA - Self-Adhered: www.vaproshield.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.02 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

- A. Vapor Retarder Coating: Cold liquid applied, Class I Vapor Retarder, resilient, UV-resistant coating and associated joint treatment. Option at masonry block behind masonry brick and stone veneer.
 1. Polymer-modified asphalt emulsion or elastomeric synthetic rubberized polymer products are acceptable.
 2. Dry Film Thickness: As required to meet manufacturer's requirements to achieve manufacturer's warranty.
 3. Water Vapor Permeance: 0.1 perm (5.8 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M.
 4. VOC Content: Less than 50 g per L when tested in accordance with 40 CFR 59, Subpart D (EPA Method 24).
 5. Resistance to Fungal Growth: No growth when tested according to ASTM D5590.
 6. Suitable for use on concrete, masonry, plywood and gypsum sheathing.
 7. Joint Preparation Treatment: Coating manufacturer's recommended method, either tape or reinforcing mesh saturated with coating material.
 8. Manufacturers:
 - a. TK Products; TK-AirMax 2103 NP; www.tkproducts.com.
 - b. BASF Corporation; ENERSHIELD-I; www.construction-chemicals.basf.com.
 - c. Carlisle Coatings and Waterproofing, Inc.; Product: Barriseal-R; www.carlisle-ccw.com.
 - d. Grace Construction; Per-A-Barrier Liquid: www.graceconstruction.com.
 - e. Henry Company; Air-Bloc 32MR: www.henry.com.
 - f. Prosoco; R-Guard VB; www.prosoco.com.
 - g. Substitutions: See Section 01 6000 - Product Requirements.
 9. Joint Filler: As recommended by coating manufacturer and suitable to the substrate.

2.03 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Mechanically Fastened Sheets - On Exterior:

1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
 2. Overlap seams as recommended by manufacturer but at least 6 inches.
 3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches (305 mm).
 4. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
 5. Install air barrier and vapor retarder underneath the jamb flashings.
 6. Install head flashings under weather barrier.
 7. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- E. Self-Adhered Sheets:
1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
 2. Lap sheets shingle-fashion to shed water and seal laps air tight.
 3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
 4. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing.
 5. At wide joints, provide extra flexible membrane allowing joint movement.
- F. Coatings:
1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
 2. Where exterior masonry veneer is to be installed, install masonry anchors before installing weather barrier over masonry; seal around anchors air tight.
 3. Use flashing to seal to adjacent construction and to bridge joints.
- G. Openings and Penetrations in Exterior Weather Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto weather barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.
 3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches (230 mm) wide, covering entire depth of framing.
 4. At head of openings, install flashing under weather barrier extending at least 2 inches (50 mm) beyond face of jambs; seal weather barrier to flashing.
 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
 6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
 1. Provide testing and inspection required by ABAA QAP.
 2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
 3. Cooperate with ABAA testing agency.
 4. Allow access to air barrier work areas and staging.
 5. Do not cover air barrier work until tested, inspected, and accepted.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

**SECTION 07 4213
METAL WALL PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for walls, soffit panels, and subgirt framing assembly, with related flashings and accessory components.

1.02 RELATED REQUIREMENTS

- A. Section 07 2100.10 - Thermal Insulation.
- B. Section 07 2500 - Weather Barriers: Weather barrier under wall panels.
- C. Section 07 9200 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.
- D. Section 09 2116 - Gypsum Board Assemblies: Wall panel substrate.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.
- C. Samples: Submit two samples of wall panel and soffit panel, illustrating finish color, sheen, and texture.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.

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 installing products of the type specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a twenty year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- C. Correct defective work within a five year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for metal wall panels.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Metal Wall Panels - Concealed Fasteners:
 - 1. Dri-Design by Kingspan: www.dri-design.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Contractor's Option: Metal Wall Panels - Concealed Clip:

1. IMETCO Element as manufactured by Innovative Metals Company, Inc.
 2. Substitutions: See Section 01 6000 - Product Requirements.
- C. Metal Soffit Panels and Column Covers:
1. Same manufacturers as listed above.
 2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MANUFACTURED METAL PANELS

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
1. Provide exterior panels, soffit panels, and subgirt framing assembly.
 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
 3. Maximum Allowable Deflection of Panel: $L/180$ for length(L) of span.
 4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 7. Corners: Factory-fabricated in one continuous piece with minimum 18 inch (450 mm) returns.
 8. Provide continuity of air barrier and vapor retarder seal at building enclosure elements in accordance with materials specified in Section 07 2500.
- B. Exterior Wall Panels, Basis of Design:
1. Profile: Horizontal; style as indicated.
 2. Side Seams: Double-interlocked with reveal, sealed with continuous gaskets.
 3. Material: Precoated aluminum sheet, 0.080" minimum thickness.
 4. Panel Width: Refer to Drawings and Details.
 5. Color: As selected by Architect from manufacturer's full line.
 6. Products:
 - a. ENV A80 Series as manufactured by Dri-Design.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Soffit Panels:
1. Profile: Style as indicated; same as above.
 2. Color: As selected by Architect from manufacturer's standard line.
- D. Subgirt Framing Assembly:
1. 16 gage, 0.0598 inch (1.52 mm) thick formed non-precoated steel sheet.
 2. Profile as indicated; to attach panel system to building.
- E. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to match wall panel system; shop cut and factory mitered to required angles. Mitered internal corners to be back braced with same gage precoated sheet stock to maintain continuity of profile. (Mitered internal corners to be back braced with same mm thick precoated sheet stock to maintain continuity of profile.)
- F. Expansion Joints: Same material, thickness and finish as exterior sheets; 22 gage, 22 inch (0.76 mm) thick; manufacturer's standard brake formed type, of profile to suit system.
- G. Trim, Closure Pieces, Caps, Flashings, Facias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- H. Anchors: Galvanized steel.

2.03 MATERIALS

- A. Precoated Aluminum Sheet: ASTM B209 (ASTM B209M), 3105 alloy, O temper, smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating and

on panel back with specified panel back coating.

2.04 FINISHES

- A. Panel Backside Finish: Panel manufacturer's standard acrylic or polyester wash coat.
- B. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent 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 (0.023 mm); color and gloss as selected by Architect from manufacturer's standard line.

2.05 ACCESSORIES

- A. Z-Girt and/or hat channel furring: Galvanized steel as detailed in drawings.
- B. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient.
- C. Concealed Sealants: Non-curing butyl sealant or tape sealant.
- D. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
- E. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
- F. Field Touch-up Paint: As recommended by panel manufacturer.
- G. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.
- B. Verify that weather barrier has been installed over substrate completely and correctly.

3.02 PREPARATION

- A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.
- B. Coordinate metal panel installation with rain screen drainage work, flashing, trim, construction of decks/parapets, walls and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

3.03 INSTALLATION

- A. Install panels on walls, soffits, and column covers in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners unless otherwise approved by Architect.
- G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.04 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch (1.6 mm).
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch (6.4 mm).

3.05 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.

- C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.
- D. Replace panels and other components of the work that have been damaged or have deteriorated beyond successful repair by finish touch up or similar minor repair procedures.

END OF SECTION

**SECTION 07 4213.23
METAL COMPOSITE MATERIAL WALL PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior cladding consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup (at Skyway envelope).
- B. Matching flashing and trim.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Plywood backing material.
- B. Section 07 2500 - Weather Barriers: Weather barrier behind wall panel system.
- C. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.
- D. Section 09 2116 - Gypsum Board Assemblies: Panel support framing.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2016.
- E. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2015.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- H. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).
- I. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- J. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- M. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives; 1998 (Reapproved 2012).
- N. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2014.
- O. ASTM D4145 - Standard Test Method for Coating Flexibility of Prepainted Sheet; 2010.
- P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- Q. 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).
- R. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
 - 1. Finish manufacturer's data sheet showing physical and performance characteristics.
 - 2. Storage and handling requirements and recommendations.
 - 3. Fabrication instructions and recommendations.
 - 4. Specimen warranty for finish, as specified herein.
- C. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
 - 1. Physical characteristics of components shown on shop drawings.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions and recommendations.
 - 4. Specimen warranty for wall system, as specified herein.
- D. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, and accessories.
 - 1. Indicate panel numbering system.
 - 2. Differentiate between shop and field fabrication.
 - 3. Indicate substrates and adjacent work with which the wall system must be coordinated.
 - 4. Include large-scale details of anchorages and connecting elements.
 - 5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches (1:10).
 - 6. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- E. Selection Samples: For each finish product specified, submit at least three sample color chips representing manufacturer's full range of available colors and patterns.
 - 1. Sealant Color: Color to match wall panels.
- F. Design Data: Submit structural calculations stamped by design engineer, for Architect's information and project record.
- G. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.
- H. Installer's Qualification Statement.
- I. Maintenance Data: Care of finishes and warranty requirements.
- J. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
- B. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications: Company specializing in manufacturing wall panel systems specified in this section.
 - 1. With not less than three years of documented experience.
- D. Installer Qualifications: Company specializing in performing work of the type specified in this section.
 - 1. With minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
 - 1. Protect finishes by applying heavy duty removable plastic film during production.
 - 2. Package for protection against transportation damage.
 - 3. Provide markings to identify components consistently with drawings.
 - 4. Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Store in well ventilated space out of direct sunlight.
 - 2. Protect from moisture and condensation with tarpaulins or other suitable weather tight covering installed to provide ventilation.
 - 3. Store at a slope to ensure positive drainage of any accumulated water.
 - 4. Do not store in any enclosed space where ambient temperature can exceed 120 degrees F (49 degrees C).
 - 5. Avoid contact with any other materials that might cause staining, denting, or other surface damage.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a two year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for insulated metal wall panels.
- C. Correct defective work within a twenty year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Composite Material (MCM) Sheet Manufacturers:
 - 1. 3A Composites USA; Alucobond Plus: www.3acompositesusa.com.
 - 2. Alcoa, Inc; Reynobond: www.alcoa.com.
 - 3. ALPOLIC Materials; ALPOLIC (PE core): www.alpolic-usa.com.
 - 4. Alucoil North America LLC; larson by Alucoil, PE Core: www.alucoilnorthamerica.com/#sle.
 - 5. Citadel Architectural Products, Inc; Envelope 2000: www.citadelap.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wall Panel System Manufacturers:
 - 1. AmeriClad, LLC; AC-1200: www.americlad.com.
 - 2. Petersen Aluminum Corporation; PAC-3000 RS: www.pac-clad.com.
 - 3. ALPOLIC Materials; Rain Screen System: www.alpolic-americas.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 WALL PANEL SYSTEM

- A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by others; provide installed panel system capable of maintaining specified performance without defects, damage or failure.
 - 1. Provide structural design by or under direct supervision of a Structural Engineer licensed in the State in which the Project is located.
 - 2. Provide panel jointing and weatherseal using reveal joints and gaskets but no sealant.
 - 3. Anchor panels to supporting framing without exposed fasteners.
- B. Performance Requirements
 - 1. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus

- 20 degrees F (minus 29 degrees C) to 180 degrees F (82 degrees C) without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.
2. Air Infiltration: 0.06 cfm/sq ft (0.003 L/s/sq m) of wall area, maximum, when tested at 1.57 psf (0.075 kPa) in accordance with ASTM E283.
 3. Water Penetration: No water penetration under static pressure when tested in accordance with ASTM E331 at a differential of 10 percent of inward acting design load, 6.24 psf (0.299 kPa) minimum, after 15 minutes.
 - a. Water penetration is defined as the appearance of uncontrolled water on the interior face of the wall.
 - b. Design to drain leakage and condensation to the exterior face of the wall.
- C. Panels: One inch (2.5 mm) deep pans formed of metal composite material sheet by routing back edges of sheet, removing corners, and folding edges.
1. Reinforce corners with riveted aluminum angles.
 2. Provide concealed attachment to supporting structure by adhering attachment members to back of panel; attachment members may also function as stiffeners.
 3. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.
 4. Secure members to back face of panels using structural silicone sealant approved by MCM sheet manufacturer.
 5. Metallic Finished Panels: Maintain consistent grain of MCM sheet; specifically, do not rotate sheet purely to avoid waste.
 6. Fabricate panels under controlled shop conditions.
 7. Where final dimensions cannot be established by field measurement before commencement of manufacturing, make allowance for field adjustments without requiring field fabrication of panels.
 8. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
 - a. Make panel lines, breaks, curves and angles sharp and true.
 - b. Keep plane surfaces free from warp or buckle.
 - c. Keep panel surfaces free of scratches or marks caused during fabrication.
 9. Provide joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on inside face of panel system.
 10. For "dry" jointing, secure extrusions to returned pan edges with stainless steel rivets; provide means of concealed drainage with baffles and weeps for water that might accumulate in members of system.

2.03 MATERIALS

- A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic or corrugated polypropylene material; no foamed insulation material content.
1. Overall Sheet Thickness: 4 mm, minimum (with architectural finish).
 2. Face Sheet Thickness: 0.019 inches (0.50 mm), minimum.
 3. Fire-rated core.
 4. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch (100 N-mm/mm) with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
 5. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 6. Flammability: Self-ignition temperature of 650 degrees F (343 degrees C) or greater, when tested in accordance with ASTM D1929.
- B. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.

1. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.
3. Stainless Steel Sheet Components: ASTM A480/A480M.
4. Aluminum Components: ASTM B209 (ASTM B209M); or ASTM B221 (ASTM B221M).

2.04 FINISHES

- A. Factory Finish: Two coat fluoropolymer resin coating, approved by coating manufacturer for length of warranty specified for project, and applied by coil manufacturing facility that specializes in coil applied finishes.
 1. Coating Flexibility: Pass ASTM D4145 minimum 1T Bend, at time of manufacturing.
 2. Long-Term Performance: Not less than that specified under WARRANTY in PART 1.
- B. Color/Texture: As selected by Architect from manufacturer's full range.

2.05 ACCESSORIES

- A. Flashing: Sheet aluminum; 0.040 inch (1.0 mm) thick, minimum; finish and color to match MCM sheet; refer to Section 07 6200 for additional requirements.
- B. Anchors, Clips and Accessories: Use one of the following:
 1. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, or ASTM A666.
 2. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A153/A153M.
 3. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A123/A123M Coating Grade 10.
- C. Fasteners:
 1. Screws: Self-drilling or self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
 2. Bolts: Stainless steel.
 3. Fasteners for Flashing and Trim: Blind fasteners of high-strength aluminum or stainless steel.
- D. Joint Sealer: Clear silicone sealant approved by MCM sheet manufacturer. Metal Composite Material Wall Panel Contractor shall provide all sealant required for a complete installation. Perimeter where panels meet adjacent construction shall be by Joint Sealant Contractor.
- E. Provide panel system manufacturer's and installer's standard corrosion resistant accessories, including fasteners, clips, anchorage devices and attachments.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine dimensions, tolerances, and interfaces with other work.
- B. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturers written instructions.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protect adjacent work areas and finish surfaces from damage during installation.

3.03 INSTALLATION

- A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.

- C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.
- D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.
- E. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.
- F. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.
- G. Install flashings as indicated on shop drawings. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.
- H. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
 - 1. Variation From Plane or Location: 1/2 inch in 30 feet (10 mm in 10 m) of length and up to 3/4 inch in 300 feet (20 mm in 100 m), maximum.
 - 2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch (0.75 mm), maximum.
- I. Replace damaged products.

3.04 FIELD QUALITY CONTROL

- A. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.
- B. Site Visits: Schedule two site visits during execution of installation.

3.05 CLEANING

- A. Replace damaged products.
- B. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- C. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- D. Remove temporary coverings and protection of adjacent work areas.
- E. Clean installed products in accordance with manufacturer's instructions.

3.06 PROTECTION

- A. Protect installed panel system from damage until Date of Substantial Completion.

END OF SECTION

**SECTION 07 5300
ELASTOMERIC MEMBRANE ROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Elastomeric roofing membrane, adhered conventional application.
- B. Insulation, flat and tapered.
- C. Vapor retarder.
- D. Deck sheathing.
- E. Cover boards.
- F. Flashings.
- G. Roofing cant strips, stack boots, roofing expansion joints, and walkway pads.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood nailers and curbs.
- B. Section 07 6200 - Sheet Metal Flashing and Trim: Counterflashings, reglets and parapet caps.
- C. Section 07 7200 - Roof Accessories: Roof-mounted units; prefabricated curbs.
- D. Section 22 1006 - Plumbing Piping Specialties: Roof drains.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- D. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- E. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).
- F. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2012).
- G. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact; 2014.
- H. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005 (Reapproved 2010).
- I. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2013.
- J. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- K. FM (AG) - FM Approval Guide; current edition.
- L. FM DS 1-28 - Wind Design; 2007.
- M. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of associated counterflashings installed under other sections.
- B. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.

- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, surfacing, and fasteners.
- C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and paver layout.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions, finish coating installation, special procedures, and perimeter conditions requiring special attention.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 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 the work of this section with minimum three years documented experience.
- C. Assurance of insulation: The roof insulation delivered to site shall be submitted to a test firm to substantiate that the product meets specified density and K factor or R values. Report test results.
- D. Assurance of roofing system: Provide a trained manufacturer's representative to perform inspections of the installation. Upon completion in order to give final approval to the installation. Submit two copies of manufacturer's representatives written report of these inspections to the owner.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- B. Store materials in weather protected environment, clear of ground and moisture.
- C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- D. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F (5 degrees C) or above 100 degrees F (38 degrees C).
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- E. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Guarantee: The Roofing Contractor shall furnish a written guarantee that during a period of (5) five years from the date of acceptance of the building, he will at his own expense make or cause to be made any repairs that may be necessary as a result of defects in workmanship or materials and/or normal wear and tear by the elements and will maintain the roof in watertight condition, free from all leaks arising from such causing. Lightning, hail storms, and tornadoes will not be considered normal wear and tear by the elements.
 - 1. This shall include the manufacturer's standard warranty, without monetary limitation, signed by the roofing system manufacturer agreeing to promptly repair leaks resulting

from defects in materials and workmanship.

- C. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- D. Standard Roofing Manufacturer's Warranty: Submit a written warranty, without monetary limitation, signed by roofing system manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:
 - 1. Period 20 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. EPDM Membrane Materials:
 - 1. Carlisle Roofing Systems, Inc: www.carlisle-syntec.com.
 - 2. Firestone Building Products, LLC: www.firestonebpco.com.
 - 3. GenFlex Roofing Systems, LLC: www.genflex.com.
 - 4. Johns Manville: www.jm.com/#sle.
 - 5. Versico Roofing Systems: www.versico.com.
 - 6. Mule-Hide Products: www.mulehide.com.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation:
 - 1. Atlas Roofing Corporation: www.atlasroofing.com.
 - 2. Benchmark Foam Inc.: www.benchmarkfoam.com.
 - 3. Dow Chemical Company: www.dow.com.
 - 4. Firestone Building Products: www.firestonebpco.com.
 - 5. GAF: www.gaf.com.
 - 6. Owens Corning Corporation: www.owenscorning.com.
 - 7. Versico Roofing Systems: www.versico.com.
 - 8. Same as membrane manufacturer.
 - 9. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROOFING - UNBALLASTED APPLICATIONS

- A. Elastomeric Membrane Roofing: One ply membrane, fully adhered, over polyisocyanurate cover board and insulation.
- B. Roofing Assembly Requirements:
 - 1. Roof Covering External Fire Resistance Classification: UL (DIR) certified Class A.
 - 2. Factory Mutual Classification: Class 1 and windstorm resistance of 1-90, in accordance with FM DS 1-28.
- C. Acceptable Insulation Types - Constant Thickness Application:
 - 1. Minimum 2 layers of polyisocyanurate board.
- D. Acceptable Insulation Types - Tapered Application:
 - 1. Tapered polyisocyanurate board.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: Ethylene-propylene-diene-terpolymer (EPDM); non-reinforced; complying with minimum properties of ASTM D4637/D4637M.
 - 1. Thickness: 0.060 inch (60 mil) (1.5 mm).
 - 2. Color: Black.
 - 3. Tensile Strength: 1,400 psi, measured in accordance with ASTM D 412.
 - 4. Ultimate Elongation: 300 percent, measured in accordance with ASTM D412.
 - 5. Durometer Hardness, Type A: 30, minimum, in accordance with ASTM D2240
 - 6. Tear Strength: 150 lbf/inch (26.3 kN/m), measured in accordance with ASTM D624.

7. Water Vapor Permeability: 2.0 perm inch, measured in accordance with ASTM E 96/E 96M.
 8. Brittleness Temperature: -49 degrees F (-45 degrees C), measured in accordance with ASTM D746.
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Flexible Flashing Material: Same material as membrane.
1. Thickness: 60 mil (1.5 mm).
 2. Color: Match membrane.

2.04 DECK SHEATHING

- A. Deck Sheathing: Gypsum sheathing complying with ASTM C1396/C1396M and ASTM C1177/C1177M, paper faced.
1. Thickness: 1/2 inch (12.7 mm), fire-resistant.

2.05 COVER BOARDS

- A. Cover Boards: Faced with high compressive strength polyisocyanurate (ISO) insulation complying with ASTM C1289, and the following characteristics:
1. Classification: Type II, Class 4 - Faced with coated or uncoated polymer-bonded glass fiber mat facers on both major surfaces of the core foam.
 2. Grade and Compressive Strength: Grade 1, 80 psi (Grade 1, 551 kPa).
 3. Board Size: 48 by 96 inches (1220 by 2440 mm).
 4. Board Thickness: 1/2 inch (12.7 mm).
 5. Manufacturers:
 - a. Firestone Building Products ISOGARD HD.
 - b. Carlisle Syntec Systems SecurShield HD.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 INSULATION

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
1. Classifications:
 - a. Type II:
 - 1) Class 2 - Faced with coated polymer-bonded glass fiber mat facers on both major surfaces of core foam.
 - 2) Compressive Strength: Classes 1-2-3, Grade 1 - 16 psi (110 kPa), minimum.
 - 3) Thermal Resistance, R-value (RSI-value): At 1-1/2 inch (38.1 mm) thick; Class 1, Grades 1-2-3 - 8.4 (1.48) at 75 degrees F (24 degrees C).
 2. Board Size: 48 by 96 inch (1220 by 2440 mm).
 3. Board Thickness: 3.0 inch (76 mm) or as indicated on drawings. Note: Refer to Drawings for multiple board configuration with staggered joints.

2.07 VAPOR BARRIER

- A. Self-Adhering Vapor Barrier/Temporary Roof
1. Thickness: 40 mills.
 2. Tensile Strength: 250 psi minimum.
 3. Peel Adhesion: 5 lbs/in
 4. Permability: 0.015 perms maximum.
 5. Air Permeance: 0.000 l*m2 @ 75 Pa.
 6. Products:
 - a. Carlisle Syntec Systems: VapAir Seal 725TR; www.carlislesyntec.com.
 - b. Versico Roofing Systems: VapAir Seal 725TR; www.versico.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.08 ACCESSORIES

- A. Prefabricated Roofing Expansion Joint Flashing: Sheet butyl over closed-cell foam backing seamed to galvanized steel flanges.

- B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- C. Cant and Edge Strips: Wood fiberboard, compatible with roofing materials ; cants formed to 45 degree angle.
- D. Sheathing Adhesive: Noncombustible type, for adhering gypsum sheathing to metal deck.
- E. Insulation Fasteners: Appropriate for purpose intended.
 - 1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.
- F. Membrane Adhesive: As recommended by membrane manufacturer.
- G. Insulation Adhesive and Fasteners: As recommended by insulation manufacturer.
- H. Keeper Strips: Manufacturer's standard perimeter restraint system used at flat to vertical transitions.
- I. Walkway Pads: Suitable for maintenance traffic, standard black color, or same color as the membrane.
 - 1. Composition: EPDM.
 - 2. Size: Manufacturer's standard size(s).
 - 3. Surface Color: Same color as membrane.
 - 4. Manufacturers:
 - a. To match roof membrane system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION - METAL DECK

- A. Install deck sheathing on metal deck.
 - 1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
 - 2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
 - 3. Tape joints.
- B. Mechanically fasten sheathing to roof deck where indicated on drawings, in accordance with Factory Mutual recommendations and roofing manufacturer's instructions.
 - 1. Over entire roof area, fasten sheathing using six fasteners with washers per sheathing board.
- C. Adhere sheathing to roof deck where indicated on drawings with continuous mopping of adhesive on each flute.
- D. Install vapor barrier in accordance with manufacturer's recommendations.

3.03 INSULATION - UNDER MEMBRANE

- A. Install vapor retarder to deck sheathing surface with adhesive in accordance with manufacturer's instructions.
 - 1. Extend vapor retarder under cant strips and blocking to deck edge.
 - 2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.
- B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

- C. Attachment of Insulation: See drawings for locations where mechanically fastened or adhered.
 - 1. Mechanically Fastened: Fasten each layer of insulation to deck in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.
 - 2. Fully Adhered: Embed each layer of insulation into full bed of adhesive in accordance with roofing and insulation manufacturers' instructions.
- D. Cover Boards: Mechanically fasten or adhere cover boards in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements. See drawings for acceptable locations for mechanically fastened coverboard.
- E. Lay subsequent layers of insulation with joints staggered minimum 6 inch (150 mm) from joints of preceding layer.
- F. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- G. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- H. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- I. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
- J. Do not apply more insulation than can be covered with membrane in same day.

3.04 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive to substrate at rate as recommended by manufacturer. Fully embed membrane in adhesive except in areas directly over or within 3 inches (75 mm) of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches (75 mm). Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- E. Mechanical Attachment Option: Apply membrane and mechanical attachment devices in accordance with manufacturer's instructions.
 - 1. Install mechanical fasteners at spacing indicated in the manufacturer's instructions.
 - 2. Install seam plates and flashings.
- F. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 6 inches (150 mm) onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- G. Around roof penetrations, seal flanges and flashings with flexible flashing.
- H. Install roofing expansion joints where indicated. Make joints watertight.
 - 1. Install prefabricated joint components in accordance with manufacturer's instructions.
- I. Coordinate installation of roof drains and sumps and related flashings.
- J. Coordinate installation of associated counterflashings installed under other sections.

3.05 FINISHING UNBALLASTED SURFACES

- A. Install walkway pads according to manufacturer's instructions. Space pad joints to permit drainage.

3.06 FIELD QUALITY CONTROL

- A. All seams shall be fastened using the manufacturer's three-inch seam tape.
- B. Any seams with more than 0.5 inch of tape visible will be covered with manufacturer's six inch cover strip.

- C. Perimeter and curb fastening shall use the manufacturer's reinforced nailer strip, minimum six-inch wide, fastened every six inches using a one-inch fastening (batten) bar.
- D. Perimeter fastening plates are not allowed as means of securing the perimeter strips.
- E. Preformed EPDM sleeves and flashing shall be a minimum 60 mils thickness with manufacturer's stamp.

3.07 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this section.
- D. At the completion of the work the contractor shall remove all rubbish and unused materials, etc., accumulated during the course of his work; and he shall leave the premises in a clean, orderly, and acceptable condition.

3.08 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

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**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 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 07 7200 - Roof Accessories: Manufactured metal roof curbs.
- C. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- E. CDA A4050 - Copper in Architecture - Handbook; current edition.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples illustrating metal finish color.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with three years of documented experience.

1.07 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.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) (0.61 mm) thick base metal.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch (0.61 mm) 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 Architect from manufacturer's full colors.

2.02 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Tin edges of copper sheet to be soldered; solder shop formed metal joints, and after soldering, remove flux, wipe and wash solder joints clean; provide weathertight joints.
- F. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- H. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing membrane. Return and brake edges.

2.03 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Protective Backing Paint: Zinc molybdate alkyd.
- D. Concealed Sealants: Non-curing butyl sealant.
- E. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- F. Plastic Cement: ASTM D4586/D4586M, Type I.
- G. Reglets: Surface mounted type, galvanized steel; face and ends covered with plastic tape.

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. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

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 (0.4 mm).
- D. All measurements required for prefabrication or installation shall be made at the building by the contractor who shall consult with the various other trades whose work adjoins his work, and he shall be responsible to work out all details as far as sheet metal work is concerned.

3.03 INSTALLATION

- A. General: Unless otherwise indicated, install sheet metal flashing and trim to copy with performance requirements, manufacturer's installation instructions and SMACNA's "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and leave as indicated. Install work with laps, joints, and seams that

will be permanently watertight and weatherproof.

1. Expansion Provisions: Provide for thermal expansion of exposed sheet metal work. Space movement joints at maximum of 10 feet (3 m) with not joints allowed within 24 inches (610 mm) of corner of intersection. Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints)
- B. Install exposed sheet metal work that is without excessive oil canning, buckling, and too marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. General flashing shall be installed at all intersections of roofs with vertical surfaces and at all projections through the roofs except that flashing for plumbing pipes through roofs is included in the plumbing division.
- D. Metal cap flashing: Install where roofs abut vertical surfaces or curbs.
- E. Roof-Edge Flashings: Secure metal flashings at roof edge according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.
- F. Base flashing shall extend up vertical surfaces not less than 8" and onto flat surfaces not less than 4"
- G. Install reglets to receive counterflashing according to the following requirements:
 1. Where reglets are shown in existing concrete or masonry walls, roofing contractor shall saw cut reglets into wall. In all cases, form cap flashing to tightly engage the preformed lock with spring action.
 2. Coordinated placement of reglets into new brick. If not placed during lay-up of masonry, roofing contractor shall saw cut reglets into the new masonry wall.
- H. Insert flashings into reglets to form tight fit; secure in place with lead wedges; pack remaining spaces with lead wool; seal flashings into reglets with sealant.
- I. Counterflashings: Coordinate installation of counterflashings with installation of assemblies to be protected by counterflashing. Install counterflashings in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded sea, or blind rivets and sealant. Lap counterflashing joints a minimum of 2 inches and bed with sealant.
- J. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- K. Apply plastic cement compound between metal flashings and felt flashings.
- L. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- M. Roof-Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.
- N. Equipment support flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.
- O. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:
 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 2. Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.
- P. Miscellaneous Items:

1. Plumber vent flashing: Furnished by plumber and installed by roofer.
 2. Flashing: Furnish and install all flashing and counter flashing around curbs, under gravel stop, fascia, pipes on the roof, and where shown on the drawings to provide a watertight installation. Seams and/or joints of counter flashing shall be staggered with those of the gravel stop and fascia so as not to fall directly adjacent to one another.
 3. Pitchpockets: Furnish pitch pockets as required.
 4. Gravel stops and wall caps shall be prefinished metal, formed as per details on drawings.
- Q. All prefinished metal colors shall be "selected by Architect"
1. Provide custom colors as noted on the drawings for reglets and overflow scuppers.

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. Clean exposed metal surface, removing substances that might cause corrosion of metal or deterioration of finishes.
- D. Provide final protection and maintain conditions that ensure sheet metal flashing and trim work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION

**SECTION 07 7200
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof Hatches.

1.02 RELATED REQUIREMENTS

- A. Section 07 6200 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Guarding floor and wall openings and holes; current edition.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
 - 5. For smoke hatches, submit evidence of approval by evaluation agency specified.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 ROOF HATCHES

- A. Roof Hatch Manufacturers:
 - 1. Activar Construction Products Group - JL Industries: www.activarcpg.com.
 - 2. Acudor Products Inc: www.acudor.com.
 - 3. Babcock-Davis: www.babcockdavis.com.
 - 4. Bilco Company: www.bilco.com.
 - 5. Milcor, Inc: www.milcorinc.com.
 - 6. PS DOORS: www.psdoors.com.
 - 7. Nystrom Building Products: www.nystrom.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.

- B. Roof Hatches, General: Factory-assembled galvanized steel frame and cover, complete with operating and release hardware.
 - 1. Style: Provide flat metal covers unless otherwise indicated.
 - 2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
 - 3. For Ships Ladder Access: Single leaf; 30 by 96 inches (762 by 2438 mm). Bilco Model L-20 or approved equal.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 - 1. Material: Stainless steel, Type 304, 14 gage, 0.0747 inch (1.90 mm) thick.
 - 2. Insulation: Manufacturer's standard; 1 inch (25 mm) rigid glass fiber, located on outside face of curb.
 - 3. Curb Height: As indicated on drawings.
- D. Metal Covers: Flush, insulated, hollow metal construction.
 - 1. Capable of supporting 40 psf (1.92 kPa) live load.
 - 2. Material: Galvanized steel; outer cover 14 gage, 0.0747 inch (1.90 mm) thick, liner 22 gage, 0.03 inch (0.76 mm) thick.
 - 3. Finish: Factory prime paint.
 - 4. Insulation: Manufacturer's standard 1 inch (25 mm) rigid glass fiber.
 - 5. Gasket: Neoprene, continuous around cover perimeter.
- E. Safety Railing System: Manufacturer's standard accessory safety rail system mounted directly to curb.
 - 1. Comply with 29 CFR 1910.23, with a safety factor of two.
 - 2. Posts and Rails: Aluminum tube.
 - 3. Gate: Same material as railing; automatic closing with latch.
 - 4. Finish: Manufacturer's standard, factory applied finish.
 - 5. Gate Hinges and Post Guides: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper aluminum.
- F. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
 - 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf (475 kPa) load.
 - 2. Hinges: Heavy duty pintle type.
 - 3. Hold open arm with vinyl-coated handle for manual release.
 - 4. Latch: Upon closing, engage latch automatically and reset manual release.
 - 5. Manual Release: Pull handle on interior.
 - 6. Locking: Padlock hasp on interior.

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.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.
- B. Set units plumb, level, and true to line without warp or rack.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Clean installed work to like-new condition.
- C. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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**SECTION 07 8100
APPLIED FIREPROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fireproofing of interior structural steel in locations identified in project drawings.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel Framing.
- B. Section 07 8400 - Firestopping.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2019 (Reapproved 2023).
- C. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2000 (2015)e1.
- D. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2015)e1.
- E. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (Reapproved 2023).
- F. UL (FRD) - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data indicating product characteristics, performance criteria, and limitations of use.
- C. Manufacturer's Certificate: Certify that applied fireproofing products meet or exceed requirements of Contract Documents.
- D. Test Reports: Reports from reputable independent testing agencies for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, as follows:
 - 1. Bond strength.
 - 2. Bond impact.
 - 3. Compressive strength.
 - 4. Fire tests using substrate materials similar those on project.
- E. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.
- F. Field Quality Control Submittals: Submit field test report.
- G. Manufacturer's Qualification Statement.

1.06 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
- C. Regulatory Requirements

1. Source Limitations: Obtain each type of sprayed fire-resistive material from one source and by a single manufacturer.
2. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials and assemblies identical to those tested for the following fire-test-response characteristics per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify packages (bags) containing sprayed fire-resistive material with appropriate markings of applicable testing and inspecting agency.
 - a. Fire-Resistance Ratings: As indicated by reference to fire-resistive designs listed in UL's "Fire Resistance Directory," or in the comparable publication of another testing and inspecting agency acceptable to authorities having jurisdiction, for sprayed fire-resistive material serving as direct-applied protection, tested per ASTM E 119.
 - b. Surface-Burning Characteristics: As indicated for each sprayed fire-resistive product required, tested per ASTM E 84.

1.07 FIELD CONDITIONS

- A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F (4 degrees C) or when temperature is predicted to be below said temperature for 24 hours after application.
- B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.
- C. Provide temporary enclosure to prevent spray from contaminating air.

1.08 WARRANTY

- A. Correct defective Work within a two year period after Date of Substantial Completion.
 1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
 2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Applied Fireproofing:
 1. Carbolite Company; Pyrolite 15: www.carbolite.com.
 2. GCP Applied Technologies; Monokote Type MK-6/HY: www.gcpat.com/fireproofing/sle.
 3. Isolatek International Corp; Cafco 300: www.isolatek.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIREPROOFING ASSEMBLIES

- A. Provide assemblies as indicated on drawings.
- B. Provide fire resistance ratings for following building elements as required by local building code:
 1. Primary structural frame, including columns, beams, and associated members: 1 hour.
 2. Roof construction, including supporting beams and joists: 1 hour.

2.03 MATERIALS

- A. Applied Fireproofing Material for Interior Applications, Concealed: Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
 1. Bond Strength: 150 pounds per square foot (7.2 kPa), minimum, when tested in accordance with ASTM E736/E736M when set and dry.
 2. Dry Density: Minimum average density of 15 lb/cu ft (240 kg/cu m), with minimum individual density of any test sample of 14 lb/cu ft (224 kg/cu m), when tested in accordance with ASTM E605/E605M.
 3. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
 4. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.

5. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.

2.04 ACCESSORIES

- A. General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire-resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistive designs indicated.
- B. Primer Adhesive: Of type recommended by applied fireproofing manufacturer.
- C. Overcoat: As recommended by manufacturer of applied fireproofing material.
- D. Metal Lath: Expanded metal lath; minimum 3.4 pounds per square foot (16 kg/sq m), galvanized finish.
- E. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive fireproofing.
- B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.
- C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.
- D. Verify that voids and cracks in substrate have been filled.
- E. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.
- F. Do not proceed with installation of fire-resistive material until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Perform tests as recommended by fireproofing manufacturer in applications where adhesion of fireproofing to substrate is in question.
- B. Remove incompatible materials that could effect bond by scraping, brushing, scrubbing, or sandblasting.
- C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.
- D. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.
- E. Close off and seal duct work in areas where fireproofing is being applied.

3.03 APPLICATION

- A. Provide temporary enclosures for interior applications to prevent deterioration of fire-resistive material due to exposure to unfavorable environmental conditions.
- B. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application
- C. Do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
- D. Install metal lath over structural members as indicated or as required by UL Assembly Design Numbers.
- E. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fire-resistive material, as applicable to particular condition of installation and as required to achieve fire-resistance ratings indicated.
- F. Apply primer adhesive in accordance with manufacturer's instructions.

- G. Apply fireproofing in uniform thickness and density as necessary to achieve required ratings.
- H. In exposed locations, trowel surface smooth and form square edges, using tools and procedures recommended by fireproofing manufacturer.
- I. Apply overcoat at the rate recommended by fireproofing manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000 - Quality Requirements.
- B. Inspect installed fireproofing after application and curing for integrity, prior to its concealment.
- C. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings and requirements of authorities having jurisdiction (AHJ).
- D. Remove and replace applications of fire-resistive material where test results indicate that they do not comply with specified requirements for cohesion and adhesion or for density, or both.
- E. Apply additional fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense will be performed to determine compliance of replaced or additional work with specified requirements
- G. Re-inspect installed fireproofing for integrity of fire protection, after installation of subsequent Work.

3.05 CLEANING

- A. Remove excess material, overspray, droppings, and debris.
- B. Remove fireproofing from materials and surfaces not required to be fireproofed.
- C. At exposed fireproofing, clean surfaces that have become soiled or stained, using manufacturer's recommended procedures.

3.06 PROTECTION OF FINISHED WORK

- A. Protect fire-resistive material, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at the time of Substantial Completion.
- B. As installation of other construction proceeds, inspect fire-resistive material and patch any damaged or removed areas.
- C. Repair or replace work that has not been successfully protected.

END OF SECTION

**SECTION 07 8123
INTUMESCENT FIRE PROTECTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thin-film intumescent fire protection.
- B. Protective and/or decorative topcoats.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel Framing.

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.

1.04 SUBMITTALS

- A. See Kraus Anderson Special Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Performance characteristics and test results.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
- C. Selection Samples: For decorative top coat, color chips representing manufacturer's full range of available colors and sheens.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company that specializes in manufacturing the type of products specified, with minimum of ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers with identification labels and testing agency markings intact and legible.
- B. Store products in manufacturer's unopened packaging until ready for installation.
 - 1. Store at temperatures not less than 50 degrees F (10 degrees C) in dry, protected area.
 - 2. Protect from freezing, and do not store in direct sunlight.
 - 3. Dispose of any materials that have come into contact with contaminants of any kind prior to application.
- C. Dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Protect areas of application from windblown dust and rain.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Intumescent Thin-Film Fire Protection:
 - 1. Albi Manufacturing Division of StanChem Inc: www.albi.com.
 - 2. Carboline Company: www.carboline.com.
 - 3. Hilti, Inc: www.us.hilti.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SYSTEM REQUIREMENTS

- A. Fireproofing: Provide intumescent thin-film fire protection systems tested by an independent testing agency in accordance with ASTM E119 and acceptable to authorities having jurisdiction (AHJ).

2.03 MATERIALS

- A. Fire Resistive Coating System: Thin-film intumescent fire protection system for structural steel.
 - 1. Surface Burning Characteristics: Tested in accordance with ASTM E84.
 - 2. For Interior Use:
 - a. Use only water-based products.
 - b. Use only products without fiber content.
 - c. VOC Content: Less than 500 g per L when tested in accordance with 40 CFR 59, Subpart D (EPA Method 24).
- B. Protective and Decorative Top Coating: As recommended by fireproofing manufacturer for exposure and substrate conditions.
 - 1. Color and Gloss: As selected by Architect.
- C. Sealers and Primer: As required by tested and listed assemblies, and recommended by fireproofing manufacturer to suit specific substrate conditions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates to determine if they are in satisfactory condition to receive intumescent fire protection; verify that substrates are clean and free of oil, grease, incompatible primers, or other foreign substances capable of impairing bond to fireproofing system.
- B. Do not begin installation until substrates have been properly prepared.
- C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 APPLICATION

- A. Comply with manufacturer's instructions for each particular intumescent fire protection system installation application as indicated.
- B. Apply manufacturer's recommended primer to required coating thickness.
- C. Apply fireproofing to full thickness over entire area of each substrate to be protected.
- D. Apply coats at manufacturer's recommended rate to achieve dry film thickness (DFT) as required for fire resistance ratings designated for each condition.
- E. Apply intumescent fire protection by spraying to maximum extent possible, and as necessary complete coverage by roller application or other method acceptable to manufacturer.

3.03 CLEANING

- A. Immediately after installation of fireproofing in each area, remove overspray and fallout from other surfaces and clean soiled areas.

3.04 PROTECTION

- A. Protect installed intumescent fire protection from damage due to subsequent construction activities, so fireproofing is without damage or deterioration before Date of Substantial Completion.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

**SECTION 07 8400
FIRESTOPPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.
- C. Mechanical and Electrical Contractors shall be responsible for firestopping their penetrations. Remaining penetrations shall be firestopped by Sealant Contractor.

1.02 RELATED REQUIREMENTS

- A. Section 07 8100 - Applied Fireproofing.
- B. Section 07 9005 - Joint Sealers.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.
- B. ITS (DIR) - Directory of Listed Products; current edition.
- C. FM (AG) - FM Approval Guide; current edition.
- D. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, MSDS sheets for each product, performance ratings, MSDS sheets for each product, limitations, MSDS sheets for each product, and MSDS sheets for each product.
- C. UL Tested Systems: Submit drawings showing typical installation details for the methods of installation. Indicate which firestop materials will be used and thickness for different hourly ratings.
- D. Engineering Judgements: Submit manufacturer's drawings for all non-standard applications where no UL tested system exists. All drawings must indicate the "Tested" UL system upon which the judgement is based so as to assess the relevance of the judgement to some known performance.
- E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Certificate from authority having jurisdiction indicating approval of materials used.
- H. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Verification of minimum three years documented experience installing work of this type.
 - 2. Licensed by local authorities having jurisdiction (AHJ).

- D. Firestop sealants upon curing, shall not re-emulsify, dissolve, leach, breakdown or otherwise be damaged over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic in a building's normal operating life.
- E. Firestop sealants selected shall be sufficiently flexible to accommodate motion such as pipe vibration, water-hammer, thermal expansion, and other normal building movement, without damage to the seal.
- F. One manufacturer shall supply all firestopping materials.
- G. All firestop materials shall be installed prior to expiration of shelf life.

1.06 COORDINATION

- A. Schedule firestopping after installation of penetrants but prior to concealing the openings.
- B. Firestopping shall precede gypsum board finishing.

1.07 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.
- C. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 1. 3M Fire Protection Products: www.3m.com/firestop.
 2. A/D Fire Protection Systems Inc: www.adfire.com.
 3. Hilti, Inc: www.us.hilti.com.
 4. Nelson FireStop Products: www.nelsonfirestop.com.
 5. Specified Technologies Inc: www.stifirestop.com.
 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E 814 that has F Rating equal to fire rating of penetrated assembly, but not less than 1 hour, and minimum T Rating Equal to F Rating and that meets all other specified requirements.
 2. The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
 3. For joints, must be tested to UL 2079 with movement capabilities equal to those of the anticipated conditions.
 4. Firestopping materials and systems must be capable of closing or filling through-openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical and mechanical duct work).
 5. Firestopping material shall be asbestos free and lead free and shall not incorporate nor require the use of hazardous solvents.
- B. Firestopping materials and systems shall meet the requirements specified herein.
- C. Architect must approve in writing any alternates to the materials and systems specified herein.

- D. All firestop products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.
- E. For applications where combustible penetrants are involved, i.e., insulated and plastic pipe, a suitable intumescent material must be used.
- F. All high-traffic openings (defined below) shall be firestopped with materials specifically designed for retrofit, such as intumescent firestop putty or pillows, and shall be labeled with warning stickers to alert future trades that the firestop materials must be replaced after removal.
 - 1. All cable tray penetrations.
 - 2. All voice, data and communications cabling.
 - 3. All sleeved cabling openings.
 - 4. Other conditions when noted in drawings.

PART 3 EXECUTION

3.01 CONDITIONS REQUIRING FIRESTOPPING

- A. General: Provide firestopping for conditions specified whether or not firestopping is indicated, and if indicated, whether such materials designated as insulation, safing, or otherwise.
- B. Through-Penetrations: Firestopping shall be installed in all open penetrations and in the annular space in all penetrations in any bearing or non-bearing fire-rated barrier.
- C. Membrane-Penetrations: Where required by code, all membrane-penetrations in rated walls shall be protected with firestopping products that meet the requirements of third party time/temperature testing.
- D. Construction Joints/Gaps: Firestopping shall be provided at all fire rated walls as indicated on project drawings.
 - 1. Between the tops of walls and the underside of floors.
 - 2. In expansion joints at fire rated walls.
 - 3. In any penetration through fire rated wall fill gaps, spaces with fire stopping material sufficient to maintain intended wall rating.
 - 4. Smoke-Stopping: As required by the other Sections, Smoke-Stops shall be provided for Through-Penetrations, Membrane-Penetrations, and Construction Gaps with a material approved and tested for such application.

3.02 EXAMINATION

- A. Verify openings are ready to receive the work of this section.
- B. Verify that all pipe, conduit, cable and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.03 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.04 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Pipe insulation shall not be removed, cut away, or otherwise interrupted through wall or floor openings. Firestop systems selected shall be appropriately tested for the thickness and type of insulation being sealed.
- D. Install labeling required by code.

- E. Firestop sealant shall be properly tooled to insure that both the proper sealant depth is maintained in the annular space, and that the adhesive bond to both the penetrating item, and the surrounding construction is achieved.
- F. All electrical, mechanical, and other service items (such as ABS DWV stacks) inside interior walls that penetrate through hourly rated wood-floor assemblies shall be firestopped with materials that have both a one hour F and a one hour T rating, in accordance with ASTM E814 (UL 1479).

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

**SECTION 07 9005
JOINT SEALERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Precompressed foam sealers.
- C. Hollow gaskets.
- D. Sealant and joint backing at masonry wall control joints & cast stone joints.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry: Sealants required at masonry wall control joints & cast stone joints.
- B. Section 07 2500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- C. Section 07 8400 - Firestopping: Firestopping sealants.
- D. Section 08 8000 - Glazing: Glazing sealants and accessories.

1.03 REFERENCE STANDARDS

- A. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.
- C. Samples: Submit two samples, illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.
- C. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
- B. Do not proceed with installation of joint sealants if joint substrates are wet or not capable of adhesion.
- C. Do not proceed with installation of joint sealants if joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

1.07 COORDINATION

- A. Coordinate the work with all sections referencing this section.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty: Contractor shall guarantee the work under this section to be weather tight for a period of five years.
- C. Correct defective work within a five year period after Date of Substantial Completion.

- D. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Silicone Sealants:
 - 1. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
 - 2. Dow Corning; Product 795 Building Sealant.
 - 3. Sika Corporation: www.usa.sika.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Polyurethane Sealants: One or two part.
 - 1. Pecora Corporation: www.pecora.com.
 - 2. Sika Corporation: www.usa.sika.com.
 - 3. Tremco Global Sealants : www.tremcosealants.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- C. Acrylic Sealants (ASTM C920):
 - 1. Tremco Global Sealants: www.tremcosealants.com.
 - 2. Pecora Corporation .
 - 3. Sika Corporation: www.usa.sika.com.
- D. Acrylic Emulsion Latex Sealants:
 - 1. Sika Corporation: www.usa.sika.com.
 - 2. Tremco, Inc. .
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SEALANTS

- A. Compatibility: Provide joint sealants, backings and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors of exposed joint sealants: As selected by Architect from manufacturer's full range.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056 sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.
 - 1. or approved equal
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

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. Sealant shall be used in the following locations but shall not be limited to these locations
 - 1. Where shown on drawings.
 - 2. All exterior joints of materials and expansion joints of every description.
 - 3. Exterior perimeter of window frames, door frames, louvers, etc.
 - 4. All interior joints of dissimilar materials where movement can be expected because of temperature changes shrinkage, settlement, etc.
 - 5. Joints between ceramic tile and other building materials.
 - 6. Joints between countertops and back splashes and adjoining walls.
 - 7. Joint between exterior walls, sidewalks, and concrete drives.
 - 8. All interior door frames.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.
 - 1. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- H. Use masking tape where required to prevent contact of sealant 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.
- I. Remove excess sealants from surfaces adjacent to joint.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

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**SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion joint cover assemblies for floor, wall, ceiling, and soffit surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 03 1000 - Concrete Forming and Accessories: Placement of joint cover assembly frames in formwork.
- B. Section 04 2000 - Unit Masonry: Placement of joint cover assembly frames in masonry.
- C. Section 04 2613 - Masonry Veneer: Placement of joint cover assembly frames in masonry.
- D. Section 07 8400 - Fire Stopping
- E. Section 07 9005 - Joint Sealers: Expansion and control joint finishing utilizing a sealant and bond breaker.
- F. Section 09 2116 - Gypsum Board Assemblies: Placement of expansion joint assemblies in gypsum board walls and ceilings.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
- C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.
- D. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Expansion Joint Cover Assemblies:
 - 1. Construction Specialties, Inc: www.c-sgroup.com.
 - 2. Nystrom, Inc: www.nystrom.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

- A. Interior Floor Joints Subject to Movement at Carpet Locations - Basis of Design: Nystrom Seismic Pan Flooring System Blockout Application
 - 1. Model: FLP/FLPw
 - 2. Material: 6063-T6 Aluminum with Rubber Seal
 - 3. Finish: Mill
 - 4. Joint Size: 2 inches
- B. Interior Floor Joints Subject to Movement at Terrazzo Locations - Basis of Design: Nystrom Seismic Aluminum Flooring System - No Bump Blockout Application
 - 1. Model: SFP/SFPw
 - 2. Material: 6063-T6 Aluminum with Rubber Seal
 - 3. Finish: Mill
 - 4. Joint Size: 2 inches
- C. Interior Rated Floor Joints Subject to Movement (provide in addition to cover above as required) - Basis of Design: Seismic Fire Barrier Floor System.
 - 1. Model: FLF/FLFw
 - 2. Joint Size: 2 inches

- D. Interior Wall or ceiling Joints Subject to Movement - Basis of Design: Nystrom Seismic Elastomeric Corridor Wall & Ceiling System - Drywall Bead Application.
 - 1. Model: LCD/LCDw
 - 2. Material: 6063-T6 Aluminum with Rubber Seal
 - 3. Joint Size: 2 inches.
 - 4. Seal Color: to be determined by Architect during Shop Drawing Submittal Review.
- E. Interior Corner Wall Joints Subject to Movement - Basis of Design: Nystrom Seismic Elastomeric Corridor Wall & Ceiling System - Interior Recessed Application.
 - 1. Model: LCD/LCDwElastomeric
 - 2. Material: 6063-T6 Aluminum with Rubber Seal
 - 3. Joint Size: 2 inches.
 - 4. Seal Color: to be determined by Architect during Shop Drawing Submittal Review.
- F. Interior Acoustical Ceiling Joints Subject to Movement - Basis of Design: Nystrom Seismic Elastomeric Corridor Ceiling System - Acoustical Tile Application.
 - 1. Model: LCE/LCEw
 - 2. Material: 6063-T6 Aluminum with Rubber Seal
 - 3. Finish: Mill
 - 4. Joint Size: 2 inches
- G. Exterior Wall Joints Subject to Seismic Movement - Basis of Design: Nystrom Seismic Compression Seal.
 - 1. Model: SES
 - 2. Seismic Compression Seal
 - 3. Material: Silicone bellow with foam sealant.
 - 4. Joint Size: 2 inches.
 - 5. Movement: +/- 50 percent (Total = 100 percent).
 - 6. Colors: Sikasil WS-295 (to be confirmed with Architect during Shop Drawing Submittal Review).
- H. Exterior Rated Wall Joints Subject to Seismic Movement - Basis of Design: Nystrom Seismic Compression Seal .
 - 1. Model: FHES1 or FHES2
 - 2. Seismic Compression Seal
 - 3. Material: Silicone bellow with foam sealant.
 - 4. Joint Size: 2 inches.
 - 5. Movement: +/- 50 percent (Total = 100 percent).
 - 6. Colors: Sikasil WS-295 (to be confirmed with Architect during Shop Drawing Submittal Review).
- I. Exterior Wall and/or Soffit Joints Subject to Seismic Movement - Basis of Design: Nystrom Seismic Elastomeric Wall & Ceiling System - Exterior Recessed Application.
 - 1. Model: EWN/EWNw
 - 2. Material: 6063-T6 Aluminum with Rubber Seal
 - 3. Finish: Mill
 - 4. Joint Size: 2 inches

2.03 EXPANSION JOINT COVER ASSEMBLIES

- A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
 - 1. Joint Dimensions and Configurations: As indicated on drawings.
 - 2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
 - 3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
 - 4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
 - 1. Exposed Finish Outdoors: Natural anodized.
 - 2. Exposed Finish at Floors: Mill finish or natural anodized.
 - 3. Exposed Finish at Walls and Ceilings: Natural anodized.
- B. Resilient Seals:
 - 1. For Ceilings: Any resilient material, flush, pleated, or hollow gasket.
 - 2. For Pedestrian Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC; Shore A hardness of 40 to 50 Durometer.
- C. Anchors and Fasteners: As recommended by cover manufacturer.
- D. Threaded Fasteners: Aluminum.
- E. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.
- B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.02 INSTALLATION

- A. Install components and accessories in accordance with manufacturer's instructions.
- B. Align work plumb and level, flush with adjacent surfaces.
- C. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION

- A. Do not permit traffic over unprotected floor joint surfaces.

END OF SECTION

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**SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Fire-rated hollow metal doors and frames.
- D. Thermally insulated hollow metal doors with frames.
- E. Hollow metal borrowed lites glazing frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - DOOR HARDWARE.
- B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 9113 - Exterior Painting: Field painting.
- D. Section 09 9123 - Interior Painting: Field painting.

1.03 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 A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. 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; 2015.
- G. 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; 2014.
- H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- J. ITS (DIR) - Directory of Listed Products; current edition.
- 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; 2006.
- O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- Q. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.
- R. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- S. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. 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.
- C. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Maintain at project site copies of reference standards relating to installation of products specified.
- C. Meet National Association of Metal Manufacturer's specifications.

1.06 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. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com.
 - 3. Steelcraft, an Allegion brand: www.allegion.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

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.
- B. **NDSU specific requirements for Hollow Metal Door and Frames:**
 - 1. All hollow metal frames and doors shall meet National Association of Metal Manufacturer's specifications.
 - 2. The same manufacturer shall be used for all hollow metal doors and frames throughout the project.
 - 3. Hollow Metal Frames:
 - a. Approved manufacturers are Ceco, Curries, and Steelcraft, or approved equal.
 - b. Manufacturer shall provide documentation for UL 10C, or other approved testing agency, stating that hollow metal applications have passed UL 10C. All necessary instructions and documentation shall be supplied to the job site, as required for code official's approval.

- c. Frame Assembly/Production:
 - 1) All frames shall be fourteen (14) gauge and comply with ASTM S569 and A568.
 - 2) Fully back weld inner jamb including stops. A sample section of welded frame corner shall be submitted for review at architect's request. "Knock-down" frames will be allowed in limited cases
 - 3) Reinforce frame hinges with a ten (10) gauge steel bar welded internally.
 - 4) Reinforce frame for rim mounted strikes with ten (10) gauge steel sheet welded inside of jamb.
 - 5) Reinforce frame head with a seven (7) gauge steel plate welded inside frame for surface mounted closures, overhead stops, and hold opens.
 - 6) Frames shall be tenon and butt type construction with face corners mitered.
 - 7) Weld all field splices to match frame.
 - 8) Frames shall be cold rolled, pickled, and annealed steel, free from scale, pits, and other defects.
 - 9) Splices must be welded, ground smooth, and puttied if necessary to conceal splice.
 - 10) After all required preparatory work, the frames shall be coated with a zinc rich primer over the grinding area and finished with a matching prime eggshell paint.
 - 11) Bituminous Coating: Frames used in a wet environment are to receive a supplier applied asphalt emulsion or other high-build, water-resistant resilient coating.
 - 12) Provide a minimum of 3 anchors per side of a standard height frame or 2'-6" on center. Provide additional anchors per manufacturer's recommendations for frames 7'-6" and higher and fire rated frames.
 - 13) Provide all necessary sleeves or clips for frame splices.
 - 14) Frames shall have three (3) rubber silencers per single door and two (2) per double door.
 - d. Frames for Exterior Doors
 - 1) Exterior sidelight frames to be glazed with 1" tempered insulated low-E glazing wherever possible to reduce energy loss. See 08 8000 - Glazing.
 - 2) Brush-type weather stripping is to be installed where exterior door meets frame.
 - e. Frames for Interior Door Frames
 - 1) Interior sidelight frames to be glazed with 1/4" laminated glazing or tempered glazing. See 08 8000 - Glazing.
 - f. Frames for electronic access-controlled doors:
 - 1) Frames for electronic access-controlled doors shall be prepared with an electrical junction box located behind the middle hinge with three-quarter inch (3/4") EMT conduit extended to 6" above the top of the frame.
 - (a) Middle hinge location shall be prepped, with no field work required, to accept an electronic power transfer hinge with monitor as manufactured by Stanley Security Solutions or approved equal. See 08 7100 - Door Hardware.
 - g. Strikes for cylindrical locks shall be 4 7/8" and conform to ANSI A115.1 and A115.2 specifications.
4. Hollow Metal Doors
- a. Approved manufacturers are Ceco, Curies, or Steelcraft, or approved equal.
 - b. Manufacturers shall provide documentation for UL 10C, ANSI A250.4, ANSI A250.5, or other approved testing agency stating that hollow metal applications have passed testing. All necessary instructions and documentation shall be supplied to the job site as required for code official's approval.
5. Door Assembly/Production:
- a. All doors shall be sixteen (16) gauge cold rolled steel with vertically stiffening reinforcements.
 - b. Reinforce top and bottom of the door with eighteen (18) gauge steel channel welded to face skins.

- c. All seams and exposed fasteners shall be continuously welded and ground smooth, completely sealed, and watertight.
 - d. Putty or fillers on door edges will not be allowed.
 - e. Reinforcement for rim exit devices shall be fourteen (14) gauge continuous steel channels projection welded or bonded to the door edge at lock and hinge side of door.
 - f. Reinforcement for surface mounted vertical latches shall be fourteen (14) gauge steel plate at top and bottom of doors.
 - g. Reinforcement for cylindrical locksets shall be fourteen (14) gauge steel projection welded to the edge of the door. The reinforcement should include tabs to center the latch both horizontally and vertically.
 - h. Reinforcement for flush bolts shall be sixteen (16) gauge steel angle projection welded to the edge of the door or a fourteen (14) gauge steel astragal with tabs drilled and tapped to receive flush bolts.
 - i. Reinforcement for surface mounted door closers and overhead stops / hold opens shall be fourteen (14) gauge steel channel 14"deep x 20" long.
 - j. Doors for electronic access-controlled openings shall be prepared with three-quarter inch (3/4") EMT conduit extended from middle hinge to lockset.
6. Exterior Doors:
- a. Exterior and vestibule locations shall be hot dipped galvanized steel having A60 zinc-iron alloy coating per ASTM 924.
 - b. Tops of exterior doors are to be flush. Flush top cap can be welded or applied with screws to secure top cap into top channel of door.
 - c. Exterior doors are to be insulated.
 - d. Exterior door edges shall be continuously welded and ground smooth.
 - e. Brush-type weather stripping is to be installed at the base of exterior doors.
 - f. Provide a minimum six inch (6") center stile for panic device between glazing on exterior doors.
 - g. Provide an eight inch (8") minimum rail on doors with panic devices. Other doors match horizontal stiles on the door with the frame.
 - h. Avoid dark color finish paints on exterior applications. Dark colors may absorb heat from the sun and well the door causing the door to bind within the frame.
 - i. Light kits on exterior door must have removable stops on the inside only. Glazing is to be one inch, tempered, low-E insulated wherever possible to reduce energy loss.
 - j. Doors for electronic access-controlled openings shall be prepared with three-quarter inch (3/4") EMT conduit extended from middle hinge to lockset.
7. Interior Doors:
- a. Light kits on interior doors may be two-piece with exposed fasteners using 1/4" laminated glazing.
8. Doors being prepped for electric locks:
- a. Middle hinge plate will be prepped to accept an electronic power transfer hinge with monitor manufactured by Stanley Security Solutions, or approved equal.
 - b. Three-quarter inch (3/4") EMT conduit will be installed between the middle hinge plate and the lockset
- C. 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. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.

- b. Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
 - e. Exterior and vestibule locations shall be hot-dipped galvanized steel javing A60 zinc-iron alloy coating per ASTM 924.
 - 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 - 3. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
 - 4. Weatherstripping: Refer to Section 08 7100.
- C. Interior Doors, Non-Fire Rated:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 2 - Seamless.
 - d. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
 - 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 - 3. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
- D. Fire-Rated Doors:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 2 - Seamless.
 - d. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
 - 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - a. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - b. Attach fire rating label to each fire rated unit.
 - 3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
 - 4. Door Thickness: 1-3/4 inch (44.5 mm), nominal.
- E. All doors shall be constructed such that at least 3/4" may be cut from the bottom of the door.

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. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type, in compliance with ASTM S568 and ASTM S569.
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 - 2. Frame Metal Thickness: 14 gage, 0.067 inch (1.7 mm), minimum.
 - 3. Weatherstripping: Separate, see Section 08 7100.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 14 gage, 0.067 inch (1.7 mm), minimum.
- E. Door Frames, Fire-Rated: Full profile/continuously welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Frame Metal Thickness: 14 gage, 0.067 inch (1.7 mm), minimum.

- F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- I. Frames in Masonry Walls: Size to suit masonry coursing with head member 2 inch (51 mm) high to fill opening without cutting masonry units.
- J. Frames Wider than 48 inches (1219 mm): Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

2.06 ACCESSORIES

- A. Glazing: As specified in Section 08 8000, factory installed.
- B. Grout for Frames: Portland cement grout with maximum 4 inch (102 mm) slump for hand troweling; thinner pumpable grout is prohibited.
- C. 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.
- D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Coat inside of frames 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. Install fire rated units in accordance with NFPA 80. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Install door hardware as specified in Section 08 7100. Coordinate installation of electrical connections to electrical hardware items.

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 (1.6 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION

**SECTION 08 1416
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire-rated and non-rated; factory finished.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 7100 - DOOR HARDWARE.
- C. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- D. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Samples: Submit two samples of door veneer, 2 x 2 inch (50.8 x 50.8 mm) in size illustrating wood grain, stain color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Algoma Hardwoods: www.algomahardwoods.com.
 - 2. Graham Wood Doors: www.grahamdoors.com.
 - 3. Marshfield DoorSystems, Inc: www.marshfielddoors.com.
 - 4. VT Industries, Inc: www.vtindustries.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS

- A. Doors: Refer to drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 - 3. Wood veneer facing with factory transparent finish.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
 - 1. Provide type framed non-bonded structural composite lumber core (FSCLC) core for doors receiving panic hardware.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent (or Semi-Transparent) Finish: White oak, veneer grade in accordance with quality standard indicated, rift cut, with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 - 1. Vertical Edges: Same species as face veneer.
 - 2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet (3 m) of each other when doors are closed.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 - 1. Provide solid blocks at lock edge, 5" top rail at all doors, and 5" top rail at all doors for hardware reinforcement.
 - 2. Provide solid blocking for other throughbolted hardware.
- C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.
- G. Provide prefinished steel edge channels at strike/lock stile of pairs of doors with panic hardware.

2.06 FACTORY FINISHING - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 5 Varnish Conversion.
 - b. Stain: To match LAM-2, as selected by Architect.
 - c. Sheen: Semigloss.
- B. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

- A. Glazing: See Section 08 8000.
- B. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws or brad nails.
- C. Door Hardware: See Section 08 7100.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

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**SECTION 08 3100
ACCESS DOORS AND PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling mounted access units.

1.02 RELATED REQUIREMENTS

- A. Section 04 2000 - Unit Masonry: Openings in masonry.
- B. Section 09 2116 - Gypsum Board Assemblies: Openings in partitions.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

1.05 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall-Mounted Units:
 - 1. Location: Where required.
 - 2. Panel Material: Aluminum extrusions with gypsum board inlay.
 - 3. Size: 12 inch by 12 inch (305 mm by 305 mm) or as required.
 - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
 - 6. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
 - 7. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.
- B. Fire-Rated Wall-Mounted Units:
 - 1. Location: Where required.
 - 2. Wall Fire-Rating: As indicated on drawings.
 - 3. Size: 12 inch by 12 inch (305 mm by 305 mm) or as required.

2.02 WALL AND CEILING MOUNTED ACCESS UNITS

- A. Manufacturers:
 - 1. Activar Construction Products Group - JL Industries: www.activarcpg.com/#sle.
 - 2. ACUDOR Products Inc: www.acudor.com/#sle.
 - 3. Babcock-Davis: www.babcockdavis.com/#sle.
 - 4. Nystrom, Inc: www.nystrom.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Door Style: Single thickness with rolled or turned in edges.
 - 2. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.

3. Steel Finish: Primed.
4. Primed and Factory Finish: Polyester powder coat; color _____.
5. Hardware:
 - a. Hardware for Fire-Rated Units: As required for listing.
 - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

**SECTION 08 3200
SLIDING GLASS DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Factory fabricated sliding glazed doors with frames and operating hardware.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Rough opening framing.
- B. Section 07 9200 - Joint Sealants: Sealing joints between door frames and adjacent construction.
- C. Section 08 8000 - Glazing: Product requirements for glass units.

1.03 REFERENCE STANDARDS

- A. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- C. ASTM E1425 - Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems; 2014.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions, elevations of different types, and framed opening tolerances.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aluminum Sliding Doors:
 - 1. Basis of Design:
 - a. Marvin Windows and Doors; Modern Multi-Slide: www.marvin.com.
 - 2. Other Acceptable Manufacturers:
 - a. C.R. Laurence Company, Inc: www.crl-arch.com/#sle.
 - b. Peerless Products, Inc: www.peerlessproducts.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SLIDING GLASS DOORS

- A. Aluminum Sliding Doors: Extruded aluminum unit frame and operable panel frame, factory fabricated, factory glazed; complete with integral sloped sill/threshold, flashings, and anchorage devices.
 - 1. Configuration: One fixed panel and one horizontal sliding panel.
 - 2. Finish: Powder coat paint finish or Color anodized.
 - 3. Color: As selected by Architect from manufacturer's standard colors.
 - 4. Aluminum Members: Factory finished; screw lock corner construction; thermally broken.
 - 5. Glass Stops: Same material and color as frame, sloped for wash.
 - 6. Operable Panels: Stainless steel bottom rollers; adjustable.
 - 7. Sill: ADA compliant sill installation.

2.03 COMPONENTS

- A. Glazing: Double glazed, clear, uncoated, air filled, fully tempered, with glass thicknesses as recommended by manufacturer for specified wind conditions.
 - 1. Flat Glass: In accordance with ASTM C1036, Type I - Transparent Flat Glass, Quality-Q3 (architectural glass).
 - 2. Fully Tempered Glass: ASTM C1048, Kind FT - Fully Tempered.
 - 3. Sound Transmission Class (STC) Glazing: Provide manufacturer's standard STC rated type; ASTM E90.

2.04 PERFORMANCE REQUIREMENTS

- A. Acoustical Performance: STC rating of 36, when tested in accordance with ASTM E90, ASTM E1425, or AAMA 1801 and ratings derived from ASTM E413 and ASTM E1332, respectively.

2.05 ASSEMBLY

- A. Factory assemble door frame as one unit, including head jambs, and sill; factory assemble operating and fixed panels.

2.06 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system.

2.07 ACCESSORIES

- A. Pull Handles: Manufacturer's standard type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings are ready to receive work and opening dimensions and clearances are as indicated on shop drawings.

3.02 PREPARATION

- A. Prepare opening to permit correct installation of door unit in conjunction with air and vapor seal.

3.03 INSTALLATION

- A. Install sliding glass door units in accordance with manufacturer's instructions.

3.04 ADJUSTING

- A. Adjust hardware for smooth operation.

3.05 CLEANING

- A. Remove protective material from factory finished surfaces.
- B. Remove labels and visible markings.

**SECTION 08 3313
COILING COUNTER DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated coiling counter doors and operating hardware.
- B. Electric motor operation; wiring from electric circuit disconnect to operator to control station.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Rough openings.
- B. Section 09 2116 - Gypsum Board Assemblies: Rough openings.
- C. Section 26 0583 - Wiring Connections: Power to disconnect.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- E. ITS (DIR) - Directory of Listed Products; current edition.
- F. NEMA MG 1 - Motors and Generators; 2014.
- G. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's standard literature showing materials and details of construction and finish. Include data on electrical operation.
- C. Shop Drawings: Indicate rough and actual opening dimensions, anchorage methods, hardware locations, and installation details.
- D. Manufacturer's Instructions: Indicate installation sequence and installation, adjustment, and alignment procedures.
- E. Operation and Maintenance Data: Indicate modes of operation, lubrication requirements and frequency, and periodic adjustments required.
- F. Project Record Documents: Include as-built electrical diagrams for electrical operation and connection to fire alarm system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Coiling Counter Doors:
 - 1. Alpine Overhead Doors, Inc; www.alpinedoors.com.
 - 2. Cornell Iron Works, Inc.; www.cornelliron.com
 - 3. The Cookson Company; www.cooksondoor.com
 - 4. Raynor Garage Doors; www.raynor.com
 - 5. Overhead Door Corporation; www.overhaddoor.com
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING COUNTER DOORS

- A. Coiling Counter Doors, Non-Fire-Rated: Aluminum slat curtain.
 - 1. Mounting: Interior face mounted above ceiling.
 - 2. Nominal Slat Size: 1-1/4 inches (32 mm) wide.

3. Slat Profile: Flat, perforated.
4. Finish: Painted, black.
5. Hood Enclosure: Manufacturer's standard; primed steel.

2.03 MATERIALS

- A. Curtain Construction: Interlocking, single thickness slats.
 1. Aluminum Slats: ASTM B221 (ASTM B221M), aluminum alloy Type 6063; minimum thickness 0.05 inch (1.3 mm).
- B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
 1. Guides for Galvanized Curtains: ASTM A36/A36M steel angles, size as indicated, hot-dip galvanized per ASTM A 123/A 123M.
- C. Hood Enclosure: Internally reinforced to maintain rigidity and shape.

2.04 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction (AHJ) as suitable for purpose specified and indicated.
 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
 1. Mounting: Side mounted.
 2. Motor Enclosure: NEMA MG 1.
 3. Motor Rating: As recommended by manufacturer; continuous duty.
 4. Motor Voltage: 110-120 VAC, single phase, 60 Hz.
 5. Manual override in case of power failure.
- C. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each electrical operator.
 1. Controls: 24 VAC circuit.
 2. Surface mounted.
- D. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 26 0583.
- F. Complete wiring from disconnect to unit components.

3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch (1.5 mm).
- C. Maximum Variation From Level: 1/16 inch (1.5 mm).
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft (3 mm per 3 m) straight edge.

3.04 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

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**SECTION 08 3323
OVERHEAD COILING DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead coiling doors and shutters, operating hardware, fire-rated and non-fire-rated; manually or electrically operated.
- B. Wiring from electric circuit disconnect to operator to control station.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 7100 - DOOR HARDWARE: Cylinder cores and keys.
- C. Section 26 0583 - Wiring Connections: Power to disconnect.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ITS (DIR) - Directory of Listed Products; current edition.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
- G. NEMA MG 1 - Motors and Generators; 2014.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- J. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- K. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general construction, electrical equipment, and component connections and details.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
- E. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.05 QUALITY ASSURANCE

- A. 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Coiling Fire Doors:
 - 1. Alpine Overhead Doors, Inc: www.alpinedoors.com.

2. C.H.I. Overhead Fire Doors: www.chiohd.com.
3. Clopay Building Products: www.clopaydoor.com.
4. Cornell Iron Works, Inc: www.cornelliron.com.
5. Entrematic: www.amarr.com/commercial.
6. Raynor Garage Doors: www.raynor.com.
7. The Cookson Company: www.cooksondoor.com.
8. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com.
9. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING DOORS

- A. Non-Fire-Rated Interior Coiling Doors: Steel slat curtain.
 1. Single thickness slats.
 2. Nominal Slat Size: 1-1/4 inches (30 mm) wide x required length.
 3. Finish: Painted, Black color.
 4. Guides: Formed track; primed steel with powder coat.
 5. Hood Enclosure: Manufacturer's standard; primed steel.
 6. Electric operation.
 - a. Provide ability to be connected to fob access to restrict use.
 7. Mounting: Surface mounted.
- B. Fire-Rated Coiling Doors: Steel slat curtain; comply with NFPA 80.
 1. Fire rating as indicated in door schedule.
 2. Provide products listed and labeled by ITS (DIR) or UL (DIR) as suitable for purpose specified and indicated on drawings.
 3. Size: As per Drawings - refer to Door Schedule, Plans, and Interior Elevations.
 4. Oversized Openings: Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated units and operating hardware assembly.
 5. Nominal Slat Size: 2 inches (50 mm) wide by required length.
 6. Finish: Factory painted, Black color.
 7. Guides, Angles: Galvanized steel.
 8. Hood Enclosure: Manufacturer's standard; primed steel.
 9. Fire Alarm Release Mechanism: Electric-motor operated from fire alarm system.
 - a. Provide resettable device without replacement of parts, except when release triggered by exposure to local heat.
 10. Electric operation.
 11. Mounting: Within framed opening.

2.03 MATERIALS AND COMPONENTS

- A. Curtain Construction: Interlocking slats.
 1. Slat Ends: Each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
 3. Steel Slats: Manufacturer's standard thickness; ASTM A653/A653M galvanized steel sheet.
- B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- C. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
 1. Hot-dip galvanized in compliance with ASTM A123/A123M.
- D. Guides - Sheet Metal: Formed from sheet metal, ___ gauge, ___ inch (___ mm) thick; ___ inch (___ mm) wide.
- E. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
- F. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding

position at mid-travel; with adjustable spring tension; requiring 25 lb (10 kg) nominal force to operate.

2.04 ELECTRIC OPERATION

- A. Electric Operators:
 - 1. Motor: Provide motors with the following features:
 - a. Activation by fire alarm systems without the need for a mechanical release device.
 - b. Resetting unit can be done with the touch of the open button on the control station.
 - c. Cornell M100 Series Motor Operators or equal.
 - 2. Mounting: Side mounted.
 - 3. Motor Enclosure:
 - a. Interior Coiling Doors: NEMA MG 1, Type 1; open drip proof.
 - 4. Motor Rating: 1/3 HP (250 W); continuous duty.
 - 5. Motor Voltage: 120 volts, single phase, 60 Hz.
 - 6. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 7. Controller Enclosure: NEMA 250, Type 4.
 - 8. Opening Speed: 12 inches per second (300 mm/sec).
 - 9. Brake: Manufacturer's standard type, activated by motor controller.
 - 10. Manual override in case of power failure.
 - 11. Refer to Section 26 0583 for electrical connections.
- B. Control Station at Fire-Rated Doors: Provide three-way key switch (Open-Close-Stop) momentary-contact control device for each operator.
- C. Control Station at Non-Rated Doors: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
 - 1. 24 volt circuit.
 - 2. Surface mounted, at interior door jamb.
 - 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - 4. Provide with ability to connect to fob access control.
- D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install fire-rated doors in accordance with NFPA 80.
- C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- F. Coordinate installation of electrical service with Section 26 0583.
- G. Complete wiring from disconnect to unit components.
- H. Install enclosure and perimeter trim.

3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch (1.6 mm).
- C. Maximum Variation From Level: 1/16 inch (1.6 mm).

- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft (3.2 mm per 3 m) straight edge.

3.04 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

**SECTION 08 3600
VERTICAL BI-FOLD DOOR**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bi-Fold-panel doors, electronically operated.
- B. Exterior cladding for door panels.
- C. Interior cladding for door panels.
- D. Operators.
- E. Electrical controls.
- F. Door opening frame structure.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Steel opening frame.
- B. Section 07 2100 - Thermal Insulation: Composite panel insulation behind cladding.
- C. Section 07 2500 - Weather Barrier: Vapor and air barriers behind cladding.
- D. Section 07 4213 - Metal Wall Panels: Door panel cladding.
- E. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- F. Section 08 4413 - Glazed Aluminum Curtain Wall: Glazing system for door.
- G. Section 08 8000 - Glazing: Glass.
- H. Section 09 9123 - Interior Painting: Finish painting.
- I. Section 26 0533.13 - Conduit for Electrical Systems: Empty conduit from electric circuit to each operator and from each operator to its control station.
- J. Section 26 0583 - Wiring Connections.

1.03 REFERENCE STANDARDS

- A. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- B. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- C. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; request attendance by affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Door Product Data: Include component construction, anchorage method, power unit, actuating device, and hardware.
- C. Door Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details. Include summary of forces and loads applied to door opening framing members and building structure.
- D. Door Opening Frame Structure Shop Drawings: Indicate dimensions, locations of load-bearing members, bracing, connections, attachments, cambers, and loads; general construction details, anchors and methods of anchorage; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design under direct supervision of Professional Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience and approved by manufacturer.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Midland Door Solutions; www.midlanddoorsolutions.com.
 - 1. Other Acceptable manufacturers
 - a. Schweiss Doors; www.bifold.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DESIGN CRITERIA

- A. Regulatory Requirements: As a minimum, comply with applicable code criteria for loads.
 - 1. See Section 01 4100 - Regulatory Requirements.

2.03 PERFORMANCE REQUIREMENTS

- A. Two-Panel Strap Lift Operated Exterior Doors: Provide doors meeting or exceeding specified performance requirements.
 - 1. Deflection Limits: Do not exceed specified limits.
 - a. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10-second duration of maximum pressure.
 - 2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
 - a. Test Pressure Differential: 10 psf (480 Pa).
 - 3. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of wall area when tested in accordance with ASTM E283/E283M at 1.57 psf (75 Pa) pressure difference across assembly.

2.04 STRAP LIFT OPERATED DOOR ASSEMBLIES

- A. Description: Assemblies consisting of primary door panel framing members, secondary framing members, truss, exterior face cladding, lift mechanism, electrical components, and interior face cladding.
 - 1. Door Panel: Manufacturer's custom design for intended application.
 - a. Nominal Size: As indicated on drawings.
 - b. Primary Framing Structure: Structural steel tubing.
 - c. Secondary Framing: Welded structural steel tubing.
 - 1) Maximum Spacing Between Vertical Members: 24 inches.
 - 2) Maximum Spacing Between Horizontal Members: 48 inches.
 - d. Exterior Face Cladding: Metal wall panels, Metal Panel-1; See Section 07 4213.
 - e. Insulation: Composite Wood and Insulation Panel (CPI). See Section 07 2500.
 - f. Interior Face Cladding: Metal wall panels.
 - g. Glazed Lights: See Sections 08 4413 & 08 8000 for types.
 - 2. Hinges: Manufacturer's standard.
 - 3. Weatherstripping: Manufacturer's standard for specified assembly.
 - 4. Lift Mechanism: Manufacturer's standard design for intended application.
 - a. Hydraulic Drive: Hydraulic actuator connected to cylinder shaft, operated by pressurized hydraulic fluid.
- B. Direct Drive Door Operating System.

1. Direct Drive Door system shall be opened and closed using a constant contact key switch at site of door.
2. Motor Design: Parallel shaft helical gearmotor with the following:
 - a. 3 HP
 - b. UL 325 Compliant
 - c. Integrated motor safety brake
 - d. 1510 lb-in Output torque
 - e. NEMA A Design
 - 1) maximum 5% slip
 - 2) high to medium starting current
 - 3) normal locked rotor torque
 - 4) normal breakdown torque
 - f. Complies with EISA energy efficiency requirements
3. Exterior Motor Mounting: Not permitted
4. Motor to be mounted above door.
5. Doors shall be electronically operated with control systems pre-wired by door manufacturer.

2.05 DOOR OPENING FRAMING STRUCTURE

- A. Design to accommodate horizontal and vertical loads while supporting the door and lift mechanism in every position.
- B. Framing Components: As required for structural design of framing.

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.

3.03 INSTALLATION

- A. Erect door support framing assembly and anchor it to existing structure in accordance with approved design.
- B. Install door unit assembly in accordance with manufacturer's instructions.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Fit and align door assembly including lift mechanisms.

3.04 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

END OF SECTION

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**SECTION 08 3613
SECTIONAL DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections.

1.03 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; 2015.
- B. ITS (DIR) - Directory of Listed Products; current edition.
- C. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
- D. NEMA MG 1 - Motors and Generators; 2014.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- H. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- E. Operation Data: Include normal operation, troubleshooting, and adjusting.
- F. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

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. Comply with applicable code for motor and motor control requirements.
- C. 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. See Section 01 7800 - Closeout Submittals for warranty requirements.
- 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. Sectional Doors:
 - 1. Clopay Corporation: www.clopaydoor.com.
 - 2. Midland Garage Door Mfg. Company: www.midlandgaragedoor.com.
 - 3. Raynor Garage Doors: www.raynor.com.
 - 4. Approved equal.

2.02 STEEL DOORS

- A. Steel Doors: Flush steel, insulated; high lift, standard lift, or low lift (verify per location) operating style with track and hardware; complying with DASMA 102 Commercial application.
 - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 - 2. Door Nominal Thickness: 2 inches (51 mm) thick.
 - 3. Exterior Finish: Pre-finished with baked enamel of color as selected from manufacturer's full range.
 - 4. Interior Finish: Pre-finished with baked enamel of color as selected from manufacturer's full range.
 - 5. R-Value: Minimum R14.86.
 - 6. Electric Operation: Electric control station.
- B. Door Panels: Flush steel construction; outer steel sheet of 0.016 inch (0.4 mm) thick, flat profile; inner steel sheet of 0.016 inch (0.4 mm) thick, textured profile; core reinforcement of 16 gauge steel roll formed to channel shape, rabbeted weather joints at meeting rails; insulated. Each door section shall have shallow ribs for additional strength and weather sealed joint for weather tight closure between sections.
- C. Window Frame: Full width aluminum panel as specified below.
- D. Glazing: Type A as specified in Section 08 8000 - Glazing.

2.03 ALUMINUM DOORS

- A. Aluminum Doors: Stile and rail aluminum with glazed panels; standard lift operating style with track and hardware; complying with DASMA 102 Commercial application.
 - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
 - 2. Door Nominal Thickness: 2 inches (50 mm) thick.
 - 3. Thermal Transmittance at Exterior Locations: U-factor (Usi-factor) of 0.31 Btu/hr sq ft degrees F (1.76 W/sq m K), maximum, in accordance with DASMA 102.
 - 4. Air Leakage Rate: Less than 0.40 cfm/sf (2.0 L/sec/sq m) when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf (75 Pa).
 - 5. Exterior Door Finish: Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.
 - 6. Interior Door Finish: Factory color anodized; Black.
 - 7. Glazed Lights: Full panel width Type A at exterior locations and Type B at interior locations as specified in Section 08 8000 - Glazing.
 - 8. Electric Operation: Electric control station.

2.04 COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch (2.3 mm) minimum thickness; 2 inch (50 mm) wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch (6 mm) thick.
- B. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- C. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

- D. Head Weatherstripping: EPDM rubber seal, one piece full length.
- E. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

2.05 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.06 ELECTRIC OPERATION

- A. Electric Operators:
 - 1. Mounting: Side mounted on cross head shaft.
 - 2. Motor Enclosure:
 - 3. Motor Rating: 1/3 hp (250 W); continuous duty.
 - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
 - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
 - 6. Controller Enclosure: NEMA 250, Type 1.
 - 7. Opening Speed: 12 inches per second (300 mm/s).
 - 8. Brake: Adjustable friction clutch type, activated by motor controller.
 - 9. Manual override in case of power failure.
- B. Motor: NEMA MG 1, Type 1.
- C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
 - 1. 24 volt circuit.
 - 2. Surface mounted, at interior door jamb.
 - 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
 - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- E. Disconnect Switch: Factory mount disconnect switch in control panel.
- F. Electric Operator: Center mounted draw bar assembly, torsion spring, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.
- G. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.
- H. Provide electric eye safety feature.
- I. Control Station: Standard three button (open-close-stop) momentary type control for each electric operator.
 - 1. 24 volt circuit.
 - 2. Surface mounted.
 - 3. Locate at inside door jamb.
- J. Hand Held Transmitter: Digital control, and resettable.

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.
- B. Verify that electric power is available and of the correct characteristics.

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. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Install perimeter trim and closures.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch (1.5 mm).
- B. Maximum Variation from Level: 1/16 inch (1.5 mm).
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch (3 mm) from 10 ft (3 m) 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. Adjust for proper operation after installation. Make inspection of installation 6 months and 12 months after Substantial Completion Date for purpose of adjusting assembly and general tightening of bolts, set screws, etc.

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 08 4313
ALUMINUM-FRAMED STOREFRONTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Door hardware: All door hardware for aluminum doors, whether included in this section or Section 08 7100 - Door Hardware, shall be provided and installed by the Aluminum Framed Entrances, Windows and Curtain Walls Contractor.

1.02 RELATED REQUIREMENTS

- A. Section 07 9005 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 08 7100 - DOOR HARDWARE: Hardware items other than specified in this section.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; 2009.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

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

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Marvin Windows and Doors; Coastline Storefront: www.marvin.com.
- B. Other Acceptable - Aluminum-Framed Storefronts Manufacturers:
 - 1. CMI Architectural Products, Inc.: www.cmiarch.com.
 - 2. EFCO Corporation: www.efcocorp.com/sle.
 - 3. Kawneer North America: www.kawneer.com.
 - 4. Manko Window Systems, Inc: www.mankowindows.com.
 - 5. Oldcastle Building Envelope; FG-1000 System: www.oldcastlebe.com/#sle.
 - 6. Tubelite, Inc; 4500 Series Storefront Framing: www.tubeliteinc.com.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Rabbet: For 1/4 inch (6 mm) monolithic glazing.
 - 2. Glazing Position: Centered (front to back).
 - 3. Finish: Class I color anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - 4. Finish Color: Dark bronze or Black.
 - 5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 - 9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 - 10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
 - 1. Glazing Stops: Flush.
 - 2. Cross-Section: 1-3/4" x 4" nominal dimension.
- B. Glazing: As specified in Section 08 8000.

- C. Swing Doors: Glazed aluminum.
 - 1. Thickness: 1-3/4 inches (43 mm).
 - 2. Top Rail: 5 inches (124 mm) wide.
 - 3. Vertical Stiles: 5 inches (124 mm) wide minimum.
 - 4. Bottom Rail: 10 inches (254 mm) wide.
 - 5. Glazing Stops: Square.
 - 6. Finish: Same as storefront.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch (0.81 mm) minimum thickness; finish to match framing members.
- D. Concealed Flashings: Galvanized steel, 26 gage, 0.0179 inch (0.45 mm) minimum base metal thickness.
- E. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- F. Glazing Accessories: As specified in Section 08 8000.

2.05 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: As selected by Architect from manufacturer's standard range.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.06 HARDWARE

- A. Other Door Hardware: As specified in Section 08 7100.
 - 1. All door hardware for aluminum doors, shall be provided and installed by the Aluminum Storefront and Curtain Wall Systems Contractor.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
- K. Install glass and infill panels in accordance with Section 08 8000, using glazing method required to achieve performance criteria.

- L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.04 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.

3.06 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

**SECTION 08 4413
GLAZED ALUMINUM CURTAIN WALL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed curtain wall, with vision glazing and glass infill panels.
- B. Aluminum doors and frames.
- C. Column covers.
- D. Door hardware: All door hardware for aluminum doors, whether included in this section or Section 08 7100 - Door Hardware, shall be provided and installed by the Aluminum Storefront and Curtain Wall Systems Contractor.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware: Door hardware in aluminum doors.
- B. Section 08 7115 - Automatic Door Operator.
- C. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2014.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- K. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015.
- L. 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).
- M. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2010).
- N. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.
- O. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples illustrating finished aluminum surface, glazing, infill panels, glazing materials.
- E. Test Reports: Submit results of full-size mock-up testing.
- F. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.
- B. Full-Size Mock-up Testing: Have a specimen representative of project conditions tested by an independent testing agency for compliance with specified air infiltration and water penetration criteria.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.
- D. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Framing system by Tubelite; www.tubeliteinc.com.
 - 1. Exterior: 400T System
 - 2. Interior: 400CW System
- B. Other Acceptable - Glazed Aluminum Curtain Walls Manufacturers:
 - 1. CMI Architectural Products, Inc.: www.cmiarch.com.
 - 2. EFCO Corporation: www.efcocorp.com.
 - 3. Kawneer North America: www.kawneer.com.
 - 4. Manko Window Systems, Inc: www.mankowindows.com.

5. Oldcastle Building Envelope: www.oldcastlebe.com.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CURTAIN WALL

- A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 1. Finish: Class I color anodized.
 - a. Factory finish surfaces that will be exposed in completed assemblies.
 - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 2. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.
 1. Design Wind Loads: Comply with the requirements listed on the structural drawings .
 2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
 - a. Expansion and contraction caused by 180 degrees F (82 degrees C) surface temperature.
 - b. Expansion and contraction caused by cycling temperature range of 170 degrees F (77 degrees C) over a 12 hour period.
 - c. Movement of curtain wall relative to perimeter framing.
 - d. Deflection of structural support framing, under permanent and dynamic loads.
- C. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
 1. Test Pressure Differential: 10 psf (480 Pa).
- D. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft (0.3 L/sec sq m) of wall area, when tested in accordance with ASTM E283 at 6.27 psf (300 Pa) pressure differential across assembly.
- E. Thermal Performance Requirements:
 1. Condensation Resistance Factor of Framing: 70, minimum, measured in accordance with AAMA 1503.
 2. Overall system U-factor shall meet the following minimum requirements:
 - a. Fixed Fenestration: 0.29
 - b. Operable Fenestration: 0.37
 - c. Entrance Doors: 0.77
 3. Solar Heat Gain Coefficient (SHGC) Projection Factor <0.2:
 - a. N Exposure: No Requirement
 - b. SEW Exposure: 0.45

2.03 COMPONENTS

- A. Aluminum Framing Members (Exterior): Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 1. Cross-Section(s): Refer to drawings and details for sizes and locations.
 2. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member as required.
 3. Composite verticals and horizontals for high thermal performance.
 4. Face Caps: Refer to drawings for face cap sizes and shapes.

- B. Glazing: As specified in Section 08 8000.
- C. Column Covers: Aluminum, 20 gage, 0.032 inch (0.81 mm) minimum thickness, finish to match curtain wall framing members.
- D. Entrance Doors: Aluminum entrance doors.
 - 1. Product:
 - a. Kawneer North America; 500 Tuffline Wide Stile Series: www.kawneer.com.
 - b. Manko Window Systems, Inc; 150 Wide Stile Doors: www.mankowindows.com.
 - c. Oldcastle BuildingEnvelope; Rugged Entrance Wide Stile: www.oldcastlebe.com.
 - d. Or similar by an approved manufacturer.
 - 2. Snap-in type neoprene bulb-type glazing with no exposed screws.
 - 3. Exterior stops shall be lock in tamper-proof type.
 - 4. Glazing Stops: Square.
 - 5. Size:
 - a. Thickness: 1-3/4 inches (43 mm)
 - b. Vertical & Top Stiles: 5 inches (124 mm) wide minimum.
 - c. Bottom Rail: 10 inches (254 mm) wide.
 - 6. Finish: Match curtain wall framing.
- E. Anodized Aluminum Closure Panels: 1/8" thick to match curtain wall where exposed; unfinished elsewhere.
- F. Anodized Aluminum Composite Panels: 1/4" thick composite panels with finish to match curtain wall framing to be provided at all infill locations as detailed on the project construction drawings.
- G. Provide steel reinforcing as required for a complete installation.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209 (ASTM B209M).
- C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.
- D. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch (0.81 mm) minimum thickness; finish to match framing members.
- E. Concealed Flashings: Galvanized steel, 26 gage, 0.0179 inch (0.45 mm) minimum base metal thickness.
- F. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.
- G. Perimeter Sealant: Aluminum Framed Entrances, Windows and Curtain Wall Contractor shall provide interior and exterior perimeter sealant. See Section 07 9005 - Joint Sealants.
- H. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- I. Glazing Accessories: As specified in Section 08 8000.
- J. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.05 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: Dark bronze.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other related work.
- B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.
- C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

- A. Install curtain wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide and install all structural steel reinforcing as determined to be required by the curtain wall manufacturer to meet wind loading requirements in accordance with the manufacturer's recommendations.
- D. Provide alignment attachments and shims to permanently fasten system to building structure.
- E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- F. Provide thermal isolation where components penetrate or disrupt building insulation.
- G. Install sill and head flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 0.5 inches per 100 ft (12 mm/30 m), whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).
- C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch (19 mm) and minimum of 1/4 inch (6 mm).

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general testing and inspection requirements.
- B. Provide field testing of installed curtain wall system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of two tests in each designated area as indicated on drawings.
 - 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
 - 3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf (200 Pa).
 - a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce (14 gram) that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
 - 4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf (75 Pa).

3.05 ADJUSTING

- A. Adjust operating sash for smooth operation.

3.06 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

**SECTION 08 7100
DOOR HARDWARE**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Sliding doors.
 - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Electromechanical door hardware.
 - 3. Automatic operators.
 - 4. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames".
 - 2. Division 08 Section "Flush Wood Doors".
 - 3. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series.
 - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 - Access Control System Units.
 - 4. UL 305 - Panic Hardware.
 - 5. ANSI/UL 437- Key Locks.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be

- rejected and subject to resubmission.
- 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
- 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
 - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
 - 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:
 - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.04 CLOSEOUT SUBMITTALS

- A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.05 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware 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.

- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize construction schedule and verify availability of materials.
 - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.07 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.08 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

1.09 REFERENCE STANDARDS

- A. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- B. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; 2011.
- C. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- E. BHMA A156.6 - American National Standard for Architectural Door Trim; 2010.
- F. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; 2010.
- G. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; 2012.
- H. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- I. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.
- J. BHMA A156.19 - American National Standard for Power Assist and Low Energy Power Operated Doors; 2013.
- K. BHMA A156.36 - American National Standard for Auxiliary Locks; 2014.
- L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- N. NFPA 101 - Life Safety Code; 2015.
- O. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.

- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- Q. UL 294 - Access Control System Units; Current Edition, Including All Revisions.
- R. UL 305 - Standard for Panic Hardware; Current Edition, Including All Revisions.
- S. UL 437 - Standard for Key Locks; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 - 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 - 5. Manufacturers:
 - a. McKinney (MK) - TA/T4A Series, 5-knuckle.
 - b. dormakaba BEST (ST) - F/FBB Series, 5-knuckle.

2.02 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets with a 1-year warranty. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 - 1. Manufacturers:
 - a. McKinney (MK) - QC (# wires) Option.
 - b. dormakaba BEST (ST) - C Option.
- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
 - 1. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
 - b. McKinney (MK) - Connector Hand Tool: QC-R003.
 - 2. Manufacturers:
 - a. McKinney (MK) - QC-C Series.

- b. dormakaba BEST (ST) - WH Series.

2.03 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
 - 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 - 2. Furnish dust proof strikes for bottom bolts.
 - 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 - 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 - 5. Manufacturers:
 - a. Door Controls International (DC).
 - b. Ives (IV).
 - c. Rockwood (RO).
- B. Coordinators: ANSI/BHMA A156.3 door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.
 - 1. Manufacturers:
 - a. Door Controls International (DC).
 - b. Ives (IV).
 - c. Rockwood (RO).
- C. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 - 1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 - 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 - 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 - 4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
 - 5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
 - 6. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hiawatha, Inc. (HI).
 - c. Rockwood (RO).

2.04 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
 - 1. Manufacturers:
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 - 4. Tubular deadlocks and other auxiliary locks.
 - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 - 6. Keyway: Match Facility Standard.

- C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
- F. Construction Keying: Provide construction master keyed cylinders.
- G. Key Registration List (Bitting List):
 - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 - 2. Provide transcript list in writing or electronic file as directed by the Owner.

2.05 KEY CONTROL

- A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
 - 1. Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.06 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 8200 Series.

2.07 CYLINDRICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.
 - 1. Electromechanical locksets shall have the following functions and features:
 - a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
 - b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
 - c. Options to be available for request-to-exit or enter signaling, latchbolt and deadbolt monitoring.
 - d. Two-year limited warranty on electrified functions.
 - 2. Manufacturers:
 - a. dormakaba BEST (BE) - 9K Series.
 - b. Sargent Manufacturing (SA) - 10X Line.
 - c. Schlage (SC) - ND Series.

2.08 DEADLOCKS AND LATCHES

- A. Cylindrical Deadlocks: ANSI/BHMA A156.36 Grade 1 Certified Products Directory (CPD) listed deadlocks to fit standard ANSI 161 preparation. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.
 - 1. Manufacturers:
 - a. dormakaba BEST (BE) - T Series.
 - b. Sargent Manufacturing (SA) - 480 Series.
 - c. Schlage (SC) - B600 Series.

2.09 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 - 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
 - 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 - 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 - 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 - 4. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
 - 1. Exit devices shall have a five-year warranty.
 - 2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 - 3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 - 4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 - 5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 - 6. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 - 7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 - 8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide

- dust proof strikes where thermal pins are required to project into the floor.
9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 10. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 11. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.
1. Provide exit devices with functions and features as follows:
 - a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
 - b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
 - c. No catch points: addition of applied deflectors or other added components are not allowed.
 - d. No visible plastic.
 - e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
 - f. Constructed of all stainless steel.
 - g. Stainless steel pullman type latch with deadlock feature.
 - h. Narrow or wide style exterior trim as specified in the hardware sets.
 - i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
 - j. Ten-year limited warranty for mechanical features.
 2. Electromechanical exit devices shall have the following functions and features:
 - a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
 - b. Wire routing for all non-access control electromechanical functions and EcoFlex trim to be contained within the carrier of the device eliminating the need for cavities in doors to be drilled. Include a protective film so that wires don't get damaged if the rail needs to be removed.
 - c. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
 - d. Options to be available for request-to-exit or enter signaling, latchbolt and touchbar monitoring.
 - e. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
 3. Manufacturers:
 - a. Sargent Manufacturing (SA) - PE80 Series.
 - b. Von Duprin (VD) - 35A/98 XP Series.

2.11 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
1. Large body cast iron surface mounted door closers shall have a 30-year warranty.
 2. Manufacturers:
 - a. LCN Closers (LC) - 4040XP Series.
 - b. Sargent Manufacturing (SA) - 281 Series.
- C. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, high efficiency door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.
1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 422 Series.

2.12 ELECTROMECHANICAL DOOR OPERATORS

- A. Electromechanical Door Operators (High Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that are UL325/991 and UL10C certified and comply with requirements for the Americans with Disabilities Act (ADA). Operators shall accommodate openings up to 250 pounds and 48" wide.
1. Provide operators with features as follows:
 - a. Non-handed with push and pull side mounting.
 - b. Activation by push button, hands-free or radio frequency devices.
 - c. Adjustable opening force and closing power.
 - d. Two-year limited warranty.
 - e. Wi-Fi interface where the operator is a secure, password protected WiFi hot spot with no connection to building's IT required.
 - 1) Simple setup with no app required.
 - 2) View status and make adjustments without removing the cover.
 - 3) Built-in logic to support single use restroom applications with no external relay boards, logic modules, position switches required.
 - f. Mounting backplate to simplify and speed up installation.
 - g. Integration with access control systems.
 2. Operators shall have the following functionality:
 - a. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.
 - b. Blow Open for Smoke Ventilation: Door opens when signal is received from alarm system allowing air or smoke to flow through opening. Door will stay open until signal from alarm system is stopped.
 - c. Emergency Interface Relay: Door closes and ignores any activation input until signal is discontinued.
 - d. Infinite Hold Open: Door will hold open at set position until power is turned off.
 - e. Latch Assist: At closed position, after an activation, the door is pulled in. After the door has closed, the door is pulled in to assist with latch release/engagement.

- f. Obstruction Detection: Door closes if it hits an obstruction while opening; door will reverse to open position if it hits an obstruction while closing. Door will stop once it hits an obstruction and will rest against the obstruction until removed.
 - g. Open Delay: Delays operator opening for locking hardware.
 - h. Outside Wall Switch Disable: When contact is closed, outside wall switch is disabled.
 - i. Power Assist: Senses the door is being opened manually and applies small amount of power to assist the user in opening the door with force less than 5 lbs. The door opens only as far as it is moved manually, then closes once released.
 - j. Power Close: Additional force to assist door closing between 7° and 2°.
 - k. Presence Detector Input: Input for external sensor to detect presence at door open or close position only.
 - l. Push & Go: As the door is manually opened, the operator "senses" movement and opens door to the full-open position.
 - m. Selector Mode Switch: Off disables the signal inputs unless Blow Open is activated, on activates the signal inputs, hold open activates the unit (unless Blow Closed is activated) to the hold open position.
 - n. Vestibule Delay: When the wall switch is pressed, first door in vestibule will open. Second door will open once vestibule door delay has expired. Delay is adjustable.
 - o. Executive Mode Feature: When the door receives an activation signal it opens and remains open until either a second signal is received, or the door is manually moved in closing direction.
3. Manufacturers:
- a. ASSA ABLOY Entrance Systems (BE) - SW200 Series.

2.13 SURFACE MOUNTED CLOSER HOLDERS

- A. Electromagnetic Door Holders: ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate 12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.
 - 1. Manufacturers:
 - a. LCN Door Closers (LC) - SEM7800 Series.
 - b. Norton Rixson (RF) - 980/990 Series.
 - c. Sargent Manufacturing (SA) - 1560 Series.

2.14 ARCHITECTURAL TRIM

- A. Door Protective Trim
 - 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
 - 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
 - 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
 - 4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
 - 5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
 - 6. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Ives (IV).
 - c. Rockwood (RO).

2.15 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 - 1. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Ives (IV).
 - c. Rockwood (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 - 1. Manufacturers:
 - a. Norton Rixson (RF).
 - b. Rockwood (RO).
 - c. Sargent Manufacturing (SA).

2.16 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. Pemko (PE).

2.17 ELECTRONIC ACCESSORIES

- A. Key Switches: Key switches furnished standard with stainless steel single gang face plate with a 12/24VDC bi-color LED indicator. Integral backing bracket permits integration with any 1 1/4" or 1 1/2" mortise type cylinder. Key switches available as momentary or maintained action and in narrow face plate options.
 - 1. Manufacturers:
 - a. Alarm Controls (AK) - MCK Series.
 - b. Securitron (SU) - MK Series.

- B. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 - 1. Manufacturers:
 - a. Securitron (SU) - DPS Series.

2.18 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.19 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9

Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

- D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
 - 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. RO - Rockwood
3. SA - SARGENT
4. OT - Other
5. BM - Besam
6. RF - Rixson
7. PE - Pemko
8. SU - Securitron

C. See next page for door hardware specs.

Hardware Sets

Set: 1.0

Doors: 177S2.2

2 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK	
1 Hinge, Full Mortise, Hvy Wt	T4A3386 QCxx (size per spec)	US32D	MK	⚡
1 Rim Exit Device, Exit Only	53 PE8810 EO	US32D	SA	⚡
1 Concealed Overhead Stop, HD	69_S	EN	SA	
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Gasketing	Included by Aluminum door supplier		OT	
1 Frame Harness	QC-C3000P		MK	⚡
1 Door Harness	QC-C**** x Required Length		MK	⚡
1 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Set: 2.0

Doors: 188.1, 188E.1, 188F.2

4 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK	
2 Hinge, Full Mortise, Hvy Wt	T4A3386 QCxx (size per spec)	US32D	MK	⚡
1 Mullion	L980A_ "	US28	SA	
1 Rim Exit Device, Storeroom	16 53 72 PE8804 x less pull	US32D	SA	⚡
1 Rim Exit Device, Exit Only	16 53 72 PE8810 EO	US32D	SA	⚡
4 Permanent Core	SFIC - Match Facility Standard		OT	
1 Mullion Cylinder	980C1	US26D	SA	
2 Pull	RM301 Mtg-Type 12XHD	US32D	RO	
2 Concealed Overhead Stop, HD	69_S	EN	SA	
2 Drop Plate & Mounting Hardware	(281D) as required	EN	SA	
2 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Gasketing	Included by Aluminum door supplier		OT	
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE	
1 Gasketing (Mullion)	5110_		PE	
2 Sweep	315_N		PE	
1 Threshold	252x3_FG		PE	

2	Frame Harness	QC-C3000P	MK	⚡
2	Door Harness	QC-C**** x Required Length	MK	⚡
2	Position Switch	DPS-M/W_	SU	⚡
1	Power Supply	Provided By Security Contractor	SU	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified	OT	

Set: 3.0

Doors: 188.2, 188E.2, 188F.1, N-188C.2

4	Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
2	Hinge, Full Mortise, Hvy Wt	T4A3386 QCxx (size per spec)	US32D	MK ⚡
1	Mullion	L980A_ "	US28	SA
1	Rim Exit Device, Exit Only	16 53 72 PE8810 EO	US32D	SA ⚡
1	Rim Exit Device, Storeroom MELR	53 56 72 PE8804 x less pull	US32D	SA ⚡
4	Permanent Core	SFIC - Match Facility Standard		OT
1	Mullion Cylinder	980C1	US26D	SA
1	Mortise Cylinder	72 43	US32D	SA
2	Pull	RM301 Mtg-Type 12XHD	US32D	RO
2	Concealed Overhead Stop, HD	69_S	EN	SA
1	Drop Plate & Mounting Hardware	(281D) as required	EN	SA
1	Surface Closer	281- mounting/arm as req'd	EN	SA
1	Auto Door Operator	by Besam (Per NDSU Standards)		BM
1	Gasketing	Included by Aluminum door supplier		OT
1	Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE
1	Gasketing (Mullion)	5110_		PE
2	Sweep	315_N		PE
1	Threshold	252x3_FG		PE
2	Frame Harness	QC-C3000P	MK	⚡
2	Door Harness	QC-C**** x Required Length	MK	⚡
2	Position Switch	DPS-M/W_	SU	⚡
1	Keyswitch	MKA	SU	⚡
1	Power Supply	Provided By Security Contractor	SU	⚡
1	Wiring Diagram	Elevation and Point to Point as Specified	OT	
1	Auto Operator Components	by Besam (Per NDSU Standards)		BM

Notes: Key-switch LED defined:

-Red LED indicates lock-side actuator switch is disabled and door is locked.

-Green LED indicates locked-side actuator switch is enabled and door is unlocked.

SECURED TIME PERIOD:

Door normally closed and locked.

Entrance by mechanical key only.

Free egress at all times, only inside actuator switch activates automatic operator for accessibility needs.

Loss of power disables automatic operator's electrical opening capability, yet operator will function as a normal mechanical door closer - Entrance by mechanical key only - free egress at all times.

-Key switch illuminating Red LED signifying secured door, lock-side actuator switch is disabled.

UNSECURED TIME PERIOD:

Door normally closed and unlocked.

Free ingress.

Depressing either actuator switch activates automatic operator for accessibility needs.

Loss of power disables automatic operator's electrical opening capability, yet operator will function as a normal mechanical door closer - Entrance by mechanical key only - free egress at all times.

-Key switch illuminating Green LED, signifying unsecure door and both actuator switches are enabled.

Set: 4.0

Doors: [306.2](#), [N-120.2](#), [N-120.3](#)

2 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK	
1 Hinge, Full Mortise, Hvy Wt	T4A3386 QCxx (size per spec)	US32D	MK	⚡
1 Rim Exit Device, Storeroom	53 72 PE8804 WEP	US32D	SA	⚡
1 Permanent Core	SFIC - Match Facility Standard		OT	
1 Surface Closer	281 CPS	EN	SA	
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
1 Kerf Weather Seal	By Frame Manufacturer		OT	
1 Rain Guard	346_ x Width of Frame Head (Omit at Overhangs)		PE	
1 Sweep	315_N		PE	
1 Threshold	252x3_FG		PE	
1 Frame Harness	QC-C3000P		MK	⚡
1 Door Harness	QC-C**** x Required Length		MK	⚡
1 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Set: 5.0

Doors: [188.3](#), [188E.3](#), [188F.4](#)

4 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
2 Hinge, Full Mortise, Hvy Wt	T4A3386 QCxx (size per spec)	US32D	MK ⚡
1 Mullion	L980A _"	US28	SA
1 Rim Exit Device, Storeroom MELR	53 55 56 72 PE8804 x less pull	US32D	SA ⚡
1 Rim Exit Device, Exit Only	53 55 56 PE8810 EO	US32D	SA ⚡
2 Permanent Core	SFIC - Match Facility Standard		OT
1 Mullion Cylinder	980C1	US26D	SA
2 Pull	RM301 Mtg-Type 12XHD	US32D	RO
2 Concealed Overhead Stop, HD	69_S	EN	SA
2 Drop Plate & Mounting Hardware	(281D) as required	EN	SA
2 Surface Closer	281- mounting/arm as req'd	EN	SA
1 Gasketing	Included by Aluminum door supplier		OT
1 Gasketing (Mullion)	5110_		PE
1 Card Reader	Provided By Security Contractor		OT
2 Frame Harness	QC-C3000P		MK ⚡
2 Door Harness	QC-C**** x Required Length		MK ⚡
2 Position Switch	DPS-M/W_		SU ⚡
1 Power Supply	Provided By Security Contractor		SU ⚡
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: SECURED TIME PERIOD:

Door normally closed and locked.

Entrance by valid card to card-reader.

Free egress at all times.

Loss of power maintains security from locked side of opening - Entrance by mechanical key only.

Door monitored for door ajar or forced open.

UNSECURED TIME PERIOD:

Unsecured period of time setup in access control system allows entrance.

Free egress at all times.

Loss of power maintains security from locked side of opening - Entrance by mechanical key only.

Set: 6.0

Doors: 188B.1, 188B.2

4 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK
2 Hinge, Full Mortise, Hvy Wt	T4A3386 QCxx (size per spec)	US32D	MK ⚡
1 Mullion	L980A _"	US28	SA

1 Rim Exit Device, Exit Only	16 53 72 PE8810 EO	US32D	SA	⚡
1 Rim Exit Device, Storeroom MELR	53 56 72 PE8804 x less pull	US32D	SA	⚡
4 Permanent Core	SFIC - Match Facility Standard		OT	
1 Mullion Cylinder	980C1	US26D	SA	
1 Mortise Cylinder	72 43	US32D	SA	
2 Pull	RM301 Mtg-Type 12XHD	US32D	RO	
2 Concealed Overhead Stop, HD	69_S	EN	SA	
1 Drop Plate & Mounting Hardware	(281D) as required	EN	SA	
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Auto Door Operator	by Besam (Per NDSU Standards)		BM	
1 Gasketing	Included by Aluminum door supplier		OT	
1 Gasketing (Mullion)	5110_		PE	
2 Frame Harness	QC-C3000P		MK	⚡
2 Door Harness	QC-C**** x Required Length		MK	⚡
2 Position Switch	DPS-M/W_		SU	⚡
1 Keyswitch	MKA		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡
1 Wiring Diagram	Elevation and Point to Point as Specified		OT	
1 Auto Operator Components	by Besam (Per NDSU Standards)		BM	

Notes: Key-switch LED defined:

-Red LED indicates lock-side actuator switch is disabled and door is locked.

-Green LED indicates locked-side actuator switch is enabled and door is unlocked.

SECURED TIME PERIOD:

Door normally closed and locked.

Entrance by mechanical key only.

Free egress at all times, only inside actuator switch activates automatic operator for accessibility needs.

Loss of power disables automatic operator's electrical opening capability, yet operator will function as a normal mechanical door closer - Entrance by mechanical key only - free egress at all times.

-Key switch illuminating Red LED signifying secured door, lock-side actuator switch is disabled.

UNSECURED TIME PERIOD:

Door normally closed and unlocked.

Free ingress.

Depressing either actuator switch activates automatic operator for accessibility needs.

Loss of power disables automatic operator's electrical opening capability, yet operator will function as a normal mechanical door closer - Entrance by mechanical key only - free egress at all times.

-Key switch illuminating Green LED, signifying unsecured door and both actuator switches are enabled.

Set: 7.0

Doors: 188.4, 188E.4, 188F.3, N-188A.2, [N-188C.1](#)

4 Hinge (Qty as Specified), Hvy Wt	T4A3386 (size per spec, NRP as applicable)	US32D	MK	
2 Hinge, Full Mortise, Hvy Wt	T4A3386 QCxx (size per spec)	US32D	MK	⚡
1 Mullion	L980A_ "	US28	SA	
1 Rim Exit Device, Storeroom MELR	53 55 56 72 PE8804 x less pull	US32D	SA	⚡
1 Rim Exit Device, Exit Only	53 55 56 PE8810 EO	US32D	SA	⚡
2 Permanent Core	SFIC - Match Facility Standard		OT	
1 Mullion Cylinder	980C1	US26D	SA	
2 Pull	RM301 Mtg-Type 12XHD	US32D	RO	
1 Concealed Overhead Stop, HD	69_S	EN	SA	
1 Drop Plate & Mounting Hardware	(281D) as required	EN	SA	
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Auto Door Operator	by Besam (Per NDSU Standards)		BM	
2 Door Stop	400 series as req'd	US26D	RO	
1 Gasketing	Included by Aluminum door supplier		OT	
1 Gasketing (Mullion)	5110_		PE	
1 Card Reader	Provided By Security Contractor		OT	
2 Frame Harness	QC-C3000P		MK	⚡
2 Door Harness	QC-C**** x Required Length		MK	⚡
2 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡
1 Wiring Diagram	Elevation and Point to Point as Specified		OT	
1 Auto Operator Components	by Besam (Per NDSU Standards)		BM	

Notes: SECURED TIME PERIOD:

Door normally closed and locked.

Entrance by valid card to card-reader.

Valid card to card-reader allows locked side actuator switch to function for activating automatic operator for ingress.

Free egress at all times.

Loss of power maintains security from locked side of opening, automatic door operator loses the electrically open operation, yet operator will function as a normal mechanical door closer - Entrance by mechanical key only.

During secured period of time, only inside actuator switch activates automatic operator for accessibility needs, unless a valid card to card-reader allows the outside actuator switch to function.

Door monitored for door ajar or forced open.

UNSECURED TIME PERIOD:

Door normally closed and unlocked.

Free ingress and egress.

Loss of power maintains security from locked side of opening, automatic door operator loses the electrically open operation - Entrance by mechanical key only.
 During unsecure period of time, depressing either actuator switch activates automatic operator for accessibility needs.

Set: 8.0

Doors: 100H2

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK	
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK	⚡
1 Fail Safe Exit Device	12 53 55 72 PE8875-xxv WEP	US32D	SA	⚡
1 Permanent Core	SFIC - Match Facility Standard		OT	
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
1 Door Stop	400 series as req'd	US26D	RO	
1 Astragal (Door MFG. Heavy Duty Standard)	By Door Manufacturer		OT	
1 Gasketing	S88_(size as required)		PE	
1 Card Reader	Provided By Security Contractor		OT	
1 Frame Harness	QC-C3000P		MK	⚡
1 Door Harness	QC-C**** x Required Length		MK	⚡
1 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Notes: SECURED TIME PERIOD:

Door normally closed and locked.
 Entrance by valid card to card-reader.
 Free egress at all times.
 Loss of power maintains security from locked side of opening - Entrance by mechanical key only.
 Door monitored for door ajar or forced open.

UNSECURED TIME PERIOD:

Unsecured period of time setup in access control system allows entrance.
 Free egress at all times.
 Loss of power maintains security from locked side of opening - Entrance by mechanical key only.

Set: 9.0

Doors: 100.1

4 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK	
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2 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK	⚡
2 Fail Secure Exit Device	53 55 72 NBPE8774-xxv WEP	US32D	SA	⚡
2 Permanent Core	SFIC - Match Facility Standard		OT	
2 Surface Closer	281 CPS	EN	SA	
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
1 Astragal (Door MFG. Heavy Duty Standard)	By Door Manufacturer		OT	
2 Silencer	608/609		RO	
1 Card Reader	Provided By Security Contractor		OT	
2 Frame Harness	QC-C3000P		MK	⚡
2 Door Harness	QC-C**** x Required Length		MK	⚡
2 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Notes: SECURED TIME PERIOD:

Door normally closed and locked.

Entrance by valid card to card-reader.

Free egress at all times.

Loss of power maintains security from locked side of opening - Entrance by mechanical key only.

Door monitored for door ajar or forced open.

UNSECURED TIME PERIOD:

Unsecured period of time setup in access control system allows entrance.

Free egress at all times.

Loss of power maintains security from locked side of opening - Entrance by mechanical key only.

Set: 10.0

Doors: 100.2

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK	
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK	⚡
1 Fail Secure Exit Device	53 55 72 PE8874-xxv WEP	US32D	SA	⚡
1 Permanent Core	SFIC - Match Facility Standard		OT	
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
1 Door Stop	400 series as req'd	US26D	RO	
1 Astragal (Door MFG. Heavy Duty Standard)	By Door Manufacturer		OT	
3 Silencer	608/609		RO	
1 Card Reader	Provided By Security Contractor		OT	

1 Frame Harness	QC-C3000P	MK	⚡
1 Door Harness	QC-C**** x Required Length	MK	⚡
1 Position Switch	DPS-M/W_	SU	⚡
1 Power Supply	Provided By Security Contractor	SU	⚡

Notes: SECURED TIME PERIOD:

Door normally closed and locked.

Entrance by valid card to card-reader.

Free egress at all times.

Loss of power maintains security from locked side of opening - Entrance by mechanical key only.

Door monitored for door ajar or forced open.

UNSECURED TIME PERIOD:

Unsecured period of time setup in access control system allows entrance.

Free egress at all times.

Loss of power maintains security from locked side of opening - Entrance by mechanical key only.

Set: 11.0

Doors: 100C

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK ⚡
1 Rim Exit Device, Storeroom	53 72 PE8804 WEP	US32D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Closer	281- mounting/arm as req'd	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
3 Silencer	608/609		RO
1 Frame Harness	QC-C3000P	MK	⚡
1 Door Harness	QC-C**** x Required Length	MK	⚡
1 Position Switch	DPS-M/W_	SU	⚡
1 Power Supply	Provided By Security Contractor	SU	⚡

Set: 12.0

Doors: 114, 234, 300, N-114

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK ⚡
1 Rim Exit Device, Storeroom	53 72 PE8804 WEP	US32D	SA ⚡

1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Closer	281 CPS	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
3 Silencer	608/609		RO
1 Frame Harness	QC-C3000P		MK ⚡
1 Door Harness	QC-C**** x Required Length		MK ⚡
1 Position Switch	DPS-M/W_		SU ⚡
1 Power Supply	Provided By Security Contractor		SU ⚡

Set: 13.0

Doors: 288C.1

4 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
2 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK ⚡
2 Surface Vert Rod Exit, Classroom	12 53 72 NBPE8713 WEP	US32D	SA ⚡
2 Permanent Core	SFIC - Match Facility Standard		OT
2 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
2 Door Stop	400 series as req'd	US26D	RO
1 Astragal	S772BL_(size as req'd)		PE
2 Silencer	608/609		RO
2 Frame Harness	QC-C3000P		MK ⚡
2 Door Harness	QC-C**** x Required Length		MK ⚡
2 Position Switch	DPS-M/W_		SU ⚡
1 Power Supply	Provided By Security Contractor		SU ⚡

Notes: Operation:

** Doors normally held open by electromagnetic holders and will be released to close upon activation of fire alarm.

**Power to electromagnetic holders and relay to fire alarm by others.

Set: 14.0

Doors: 100H6, 100H9, 188A.1, 188A.2, 1913.1, 1913.2, 288D, 288G.1, 288G.2, W-002, W-188

4 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
2 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK ⚡

2 Surface Vert Rod Exit, Classroom	12 53 72 NBPE8713 WEP	US32D	SA	⚡
2 Permanent Core	SFIC - Match Facility Standard		OT	
2 Surface Closer	281- mounting/arm as req'd	EN	SA	
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
2 Electromagnetic Holder	998M	689	RF	⚡
1 Astragal	S772BL_(size as req'd)		PE	
1 Gasketing	S88_(size as required)		PE	
2 Frame Harness	QC-C3000P		MK	⚡
2 Door Harness	QC-C**** x Required Length		MK	⚡
2 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Notes: Operation:

** Doors normally held open by electromagnetic holders and will be released to close upon activation of fire alarm.

**Power to electromagnetic holders and relay to fire alarm by others.

Set: 15.0

Doors: [W-188A](#)

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK	
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK	⚡
1 Rim Exit Device, Classroom	12 53 72 PE8813 WEP	US32D	SA	⚡
1 Permanent Core	SFIC - Match Facility Standard		OT	
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
1 Electromagnetic Holder	998M	689	RF	⚡
1 Gasketing	S88_(size as required)		PE	
1 Frame Harness	QC-C3000P		MK	⚡
1 Door Harness	QC-C**** x Required Length		MK	⚡
1 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Notes:

Operation:

** Doors normally held open by electromagnetic holders and will be released to close upon activation of

fire alarm.

**Power to electromagnetic holders and relay to fire alarm by others.

Set: 16.0

Doors: [288B](#), [288C.2](#), [306.1](#)

4 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
2 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK ⚡
2 Surface Vert Rod Exit, Classroom	12 53 72 NBPE8713 WEP	US32D	SA ⚡
2 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Closer	281 CPS	EN	SA
1 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Astragal	S772BL _(size as req'd)		PE
2 Silencer	608/609		RO
2 Frame Harness	QC-C3000P		MK ⚡
2 Door Harness	QC-C**** x Required Length		MK ⚡
2 Position Switch	DPS-M/W_		SU ⚡
1 Power Supply	Provided By Security Contractor		SU ⚡

Notes: Operation:

** Doors normally held open by electromagnetic holders and will be released to close upon activation of fire alarm.

**Power to electromagnetic holders and relay to fire alarm by others.

Set: 17.0

Doors: [177S2.1](#), [277S](#), [277SB](#), [377S](#), [377S3](#)

4 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK
2 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK ⚡
1 Surface Vert Rod Exit, Passage	12 53 NBPE8715 WEP	US32D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
2 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO

2 Electromagnetic Holder	998M	689	RF	⚡
2 Astragal	S772BL_(size as req'd)		PE	
1 Gasketing	S88_(size as required)		PE	
1 Frame Harness	QC-C3000P		MK	⚡
2 Door Harness	QC-C**** x Required Length		MK	⚡
2 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Notes: Operation:

** Doors normally held open by electromagnetic holders and will be released to close upon activation of fire alarm.

**Power to electromagnetic holders and relay to fire alarm by others.

Set: 18.0

Doors: 077S

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK	
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK	⚡
1 Rim Exit Device, Passage	12 53 PE8815 WEP	US32D	SA	⚡
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
1 Door Stop	400 series as req'd	US26D	RO	
1 Gasketing	S88_(size as required)		PE	
1 Frame Harness	QC-C3000P		MK	⚡
1 Door Harness	QC-C**** x Required Length		MK	⚡
1 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Notes: Door monitored for door ajar and forced open.

Set: 19.0

Doors: 177S, 377S2

2 Hinge (Qty as Specified), Hvy Wt	T4A3786 (size per spec, NRP as applicable)	US26D	MK	
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK	⚡

1 Rim Exit Device, Passage	12 53 PE8815 WEP	US32D	SA	⚡
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
1 Electromagnetic Holder	998M	689	RF	⚡
1 Gasketing	S88_(size as required)		PE	
1 Frame Harness	QC-C3000P		MK	⚡
1 Door Harness	QC-C**** x Required Length		MK	⚡
1 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡

Notes:

Operation:

** Doors normally held open by electromagnetic holders and will be released to close upon activation of fire alarm.

**Power to electromagnetic holders and relay to fire alarm by others.

Set: 20.0

Doors: 106.1, 106.2, 112, 128, 232, 236.2, 240, 244.1, 244.2, 250.1, 250.2, 252, 308.1, 308.2, 312.1, 312.2, 314.1, 314.2, 316, 322.1, 324.2, D-214, N-116.1, N-200.1, N-200.2, N-202, N-232, N-232A, N-234, W-109B, W-113, W-121

2 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK	
1 Hinge, Hvy Wt, QC	T4A3786 QCxx (size per spec)	US26D	MK	⚡
1 Fail Secure Lock	RX 72 10XG71 LP	US26D	SA	⚡
1 Permanent Core	SFIC - Match Facility Standard		OT	
1 Surface Closer	281- mounting/arm as req'd	EN	SA	
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO	
1 Door Stop	400 series as req'd	US26D	RO	
3 Silencer	608/609		RO	
1 Frame Harness	QC-C3000P		MK	⚡
1 Door Harness	QC-C**** x Required Length		MK	⚡
1 Position Switch	DPS-M/W_		SU	⚡
1 Power Supply	Provided By Security Contractor		SU	⚡
1 Wiring Diagram	Elevation and Point to Point as Specified		OT	

Notes: Coordinate voltage, operation and electrical characteristics with all related trades.

Card Reader (where required), wiring and connections by security provider.

Set: 21.0

Doors: 100B, 101.1, 101.2, D-201, D-202.1, D-202.2, D-204, D-212, D-215.1, D-215.2, D-288B, N-102, N-104, N-106, N-107, N-202R

2 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Hinge	TA2714 QCxx (size per spec)	US26D	MK ⚡
1 Fail Secure Lock	RX 72 10XG71 LP	US26D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Closer	281 CPS	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
3 Silencer	608/609		RO
1 Frame Harness	QC-C3000P		MK ⚡
1 Door Harness	QC-C**** x Required Length		MK ⚡
1 Position Switch	DPS-M/W_		SU ⚡
1 Power Supply	Provided By Security Contractor		SU ⚡
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Coordinate voltage, operation and electrical characteristics with all related trades.

Card Reader (where required), wiring and connections by security provider.

Set: 22.0

Doors: 100H, 126, 221, N-120.1, N-122.1, N-124.1, N-124.2, N-212, N-214.1, W-235

2 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Hinge	TA2714 QCxx (size per spec)	US26D	MK ⚡
1 Fail Secure Lock	RX 72 10XG71 LP	US26D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Overhead Stop, HD	59_S	EN	SA
1 Drop Plate & Mounting Hardware	(281D) as required	EN	SA
1 Surface Closer	281- mounting/arm as req'd	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
3 Silencer	608/609		RO

1 Frame Harness	QC-C3000P	MK	⚡
1 Door Harness	QC-C**** x Required Length	MK	⚡
1 Position Switch	DPS-M/W_	SU	⚡
1 Power Supply	Provided By Security Contractor	SU	⚡
1 Wiring Diagram	Elevation and Point to Point as Specified	OT	

Notes: Coordinate voltage, operation and electrical characteristics with all related trades.

Card Reader (where required), wiring and connections by security provider.

Set: 23.0

Doors: 102, 108, 226, 228.1, 228.2, 322.2, 324.1, N-110.1, N-112.1, N-204

5 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Hinge	TA2714 QCxx (size per spec)	US26D	MK ⚡
1 Dust Proof Strike	570	US26D	RO
1 Self-Latching Flush Bolt Set	2845 / 2945	US26D	RO
1 Fail Secure Lock	RX 72 10XG71 LP	US26D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
2 Mounting Bracket	2601AB/C	Gray	RO
1 Coordinator	2600 series (mounting as req'd)	US28	RO
2 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
2 Door Stop	400 series as req'd	US26D	RO
1 Astragal (Door MFG. Heavy Duty Standard)	By Door Manufacturer		OT
2 Silencer	608/609		RO
1 Frame Harness	QC-C3000P	MK	⚡
1 Door Harness	QC-C**** x Required Length	MK	⚡
2 Position Switch	DPS-M/W_	SU	⚡
1 Power Supply	Provided By Security Contractor	SU	⚡
1 Wiring Diagram	Elevation and Point to Point as Specified	OT	

Notes: Coordinate voltage, operation and electrical characteristics with all related trades.

Card Reader (where required), wiring and connections by security provider.

Set: 24.0

Doors: 100A.1, 236.1, 310, 326, N-108, N-138, N-206, N-208

5 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Hinge	TA2714 QCxx (size per spec)	US26D	MK ⚡
1 Dust Proof Strike	570	US26D	RO
1 Self-Latching Flush Bolt Set	2845 / 2945	US26D	RO
1 Fail Secure Lock	RX 72 10XG71 LP	US26D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
2 Mounting Bracket	2601AB/C	Gray	RO
1 Coordinator	2600 series (mounting as req'd)	US28	RO
1 Surface Closer	281 CPS	EN	SA
1 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Astragal	357_ (Size as Req'd)		PE
2 Silencer	608/609		RO
1 Frame Harness	QC-C3000P		MK ⚡
1 Door Harness	QC-C**** x Required Length		MK ⚡
2 Position Switch	DPS-M/W_		SU ⚡
1 Power Supply	Provided By Security Contractor		SU ⚡
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Coordinate voltage, operation and electrical characteristics with all related trades.

Card Reader (where required), wiring and connections by security provider.

Set: 25.0

Doors: N-103, N-110.2

5 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Hinge	TA2714 QCxx (size per spec)	US26D	MK ⚡
1 Dust Proof Strike	570	US26D	RO
1 Self-Latching Flush Bolt Set	2845 / 2945	US26D	RO
1 Fail Secure Lock	RX 72 10XG71 LP	US26D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Mounting Bracket	2601AB/C	Gray	RO

1 Coordinator	2600 series (mounting as req'd)	US28	RO
2 Surface Closer	281 CPS	EN	SA
2 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
2 Door Stop	400 series as req'd	US26D	RO
1 Astragal	357_ (Size as Req'd)		PE
2 Silencer	608/609		RO
1 Frame Harness	QC-C3000P		MK ⚡
1 Door Harness	QC-C**** x Required Length		MK ⚡
1 Position Switch	DPS-M/W_		SU ⚡
1 Power Supply	Provided By Security Contractor		SU ⚡
1 Wiring Diagram	Elevation and Point to Point as Specified		OT

Notes: Coordinate voltage, operation and electrical characteristics with all related trades.

Card Reader (where required), wiring and connections by security provider.

Set: 26.0

Doors: [100A.2](#), [N-210](#)

7 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Hinge	TA2714 QCxx (size per spec)	US26D	MK ⚡
1 Dust Proof Strike	570	US26D	RO
1 Self-Latching Flush Bolt Set	2845 / 2945	US26D	RO
1 Fail Secure Lock	RX 72 10XG71 LP	US26D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
2 Mounting Bracket	2601AB/C	Gray	RO
1 Coordinator	2600 series (mounting as req'd)	US28	RO
1 Surface Overhead Stop, HD	59_S	EN	SA
1 Drop Plate & Mounting Hardware	(281D) as required	EN	SA
2 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Astragal	357_ (Size as Req'd)		PE
2 Silencer	608/609		RO
1 Frame Harness	QC-C3000P		MK ⚡
1 Door Harness	QC-C**** x Required Length		MK ⚡

2 Position Switch	DPS-M/W_	SU	⚡
1 Power Supply	Provided By Security Contractor	SU	⚡
1 Wiring Diagram	Elevation and Point to Point as Specified	OT	

Notes: Coordinate voltage, operation and electrical characteristics with all related trades.

Card Reader (where required), wiring and connections by security provider.

Set: 27.0

Doors: 100D, 100F, N-112.2


5 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Hinge	TA2714 QCxx (size per spec)	US26D	MK ⚡
1 Dust Proof Strike	570	US26D	RO
1 Self-Latching Flush Bolt Set	2845 / 2945	US26D	RO
1 Fail Secure Lock	RX 72 10XG71 LP	US26D	SA ⚡
1 Permanent Core	SFIC - Match Facility Standard		OT
2 Mounting Bracket	2601AB/C	Gray	RO
1 Coordinator	2600 series (mounting as req'd)	US28	RO
2 Surface Overhead Stop, HD	59_S	EN	SA
2 Drop Plate & Mounting Hardware	(281D) as required	EN	SA
2 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Astragal	357_ (Size as Req'd)		PE
2 Silencer	608/609		RO
1 Frame Harness	QC-C3000P		MK ⚡
1 Door Harness	QC-C**** x Required Length		MK ⚡
2 Position Switch	DPS-M/W_	SU	⚡
1 Power Supply	Provided By Security Contractor	SU	⚡
1 Wiring Diagram	Elevation and Point to Point as Specified	OT	

Notes: Coordinate voltage, operation and electrical characteristics with all related trades.

Card Reader (where required), wiring and connections by security provider.


Set: 28.0

Doors: 02B, 110, 248, 254, 332

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Storeroom/Closet Lock	72 10XG04 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Closer	281- mounting/arm as req'd	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_		SU 


Set: 29.0

Doors: 002A, D-203, D-211, N210B, N-210B, N-230

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Storeroom/Closet Lock	72 10XG04 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Overhead Stop, HD	59_S	EN	SA
1 Drop Plate & Mounting Hardware	(281D) as required	EN	SA
1 Surface Closer	281- mounting/arm as req'd	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_		SU 

Set: 30.0

Doors: 004, 188, 188E, 188F, D-288D, N-118, N-132A, N-388

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Storeroom/Closet Lock	72 10XG04 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Closer	281 CPS	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Gasketing	S88_(size as required)		PE
1 Position Switch	DPS-M/W_		SU 

Set: 31.0

Doors: 330, N-116.2

6 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Dust Proof Strike	570	US26D	RO
2 Manual Flush Bolt	555 / 557	US26D	RO
1 Storeroom/Closet Lock	72 10XG04 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
2 Surface Overhead Stop, HD	59_S	EN	SA
1 Drop Plate & Mounting Hardware	(281D) as required	EN	SA
1 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Astragal	357_ (Size as Req'd)		PE
2 Silencer	608/609		RO
2 Position Switch	DPS-M/W_		SU ⚡

Set: 32.0

Doors: 328

6 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Dust Proof Strike	570	US26D	RO
2 Manual Flush Bolt	555 / 557	US26D	RO
1 Storeroom/Closet Lock	72 10XG04 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Overhead Stop, HD	59_S	EN	SA
1 Surface Closer	281- mounting/arm as req'd	EN	SA
2 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
2 Door Stop	400 series as req'd	US26D	RO
1 Astragal	357_ (Size as Req'd)		PE
2 Silencer	608/609		RO
2 Position Switch	DPS-M/W_		SU ⚡

Set: 33.0

Doors: 106A, 106B, 106D, 106E, 106F, 106G, 106H, 106J, 106K, 200.1, 200.2, 214, 216, 218, 220, 222, 224, 250A, 250B, 250C, 250D, 250E, 250F, 250G, 250H, 302, 318.2, D201B, D-201C, D-201D, D-210, N-130, N-202A, N-202B, N-202C, N-202D, N-202E, N-202F, N-202G, N-202J, N-202K, N-202L, N-202M, N-202N, N-202P, N-202Q, N-202S, N-202T, N-202U, N-216, N-218, N-220, N-222, N-224, N-226, N-228

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Entry/Office Lock	72 10XG05 LP	US26D	SA

1 Permanent Core	SFIC - Match Facility Standard		OT
1 Door Stop	400 series as req'd	US26D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_		SU ⚡

Set: 34.0

Doors: [N-202H](#)

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Entry/Office Lock	72 10XG05 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Overhead Stop, HD	59_S	EN	SA
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_		SU ⚡

Set: 35.0

Doors: [221A1](#), [244A](#), [244B](#), [244C](#), [244D](#), [244E](#), [244F](#), [244G](#), [244H](#), [244J](#), [244K](#), [244L](#), [244M](#), [244N](#), [244P](#)

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Classroom Lock	72 10XG37 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Door Stop	400 series as req'd	US26D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_		SU ⚡

Set: 36.0

Doors: [106C](#)

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Classroom Lock	72 10XG37 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Overhead Stop, HD	59_S	EN	SA
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_		SU ⚡

Set: 37.0

Doors: [104](#), [204](#), [206](#), [208](#), [210](#), [212](#), [221A](#), [221B](#), [227](#), [230](#), [242](#), [304](#), [318.1](#), [320](#)

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Classroom Lock	72 10XG37 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Closer	281- mounting/arm as req'd	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_	SU	⚡

Set: 38.0

Doors: [202.1](#), [202.2](#)

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Classroom Lock	72 10XG37 LP	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Surface Overhead Stop, HD	59_S	EN	SA
1 Drop Plate & Mounting Hardware	(281D) as required	EN	SA
1 Surface Closer	281- mounting/arm as req'd	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_	SU	⚡

Set: 39.0

Doors: [D-201A](#), [N-214.2](#), [N-214A](#)

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Passage Latch	10XU15 LP	US26D	SA
1 Door Stop	400 series as req'd	US26D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_	SU	⚡

Set: 40.0

Doors: [322.3](#)

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
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	applicable)		
1 Passage Latch	10XU15 LP	US26D	SA
1 Surface Overhead Stop, HD	59_S	EN	SA
1 Drop Plate & Mounting Hardware	(281D) as required	EN	SA
1 Surface Closer	281- mounting/arm as req'd	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_	SU	⚡

Set: 41.0

Doors: 199F, 199L, 299U, 318A, 318B, 399U, N-199U, N-199U1, N-299U, N-299U1, W-299U, W-299U1

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Privacy Lock	V21 8265 LNP	US26D	SA
1 Surface Closer	422 mounting as required	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
1 Mop Plate	K1050 4" high 4BE CSK	US32D	RO
1 Door Stop	400 series as req'd	US26D	RO
1 Gasketing	S88_(size as required)		PE
1 Position Switch	DPS-M/W_	SU	⚡
1 Coat Hook	RM812	US26D	RO

Set: 42.0

Doors: 199M, 199W, 299M, 299W, 399M, 399W, D-299M

3 Hinge (Qty as Specified)	TA2714 (size per spec, NRP as applicable)	US26D	MK
1 Deadbolt	72 487	US26D	SA
1 Permanent Core	SFIC - Match Facility Standard		OT
1 Push Plate	73C	US32D	RO
1 Door Pull	107 Mtg-Type 8	US26D	RO
1 Surface Closer	422 mounting as required	EN	SA
1 Kick Plate	K1050 10" (high) CSK BEV	US32D	RO
3 Silencer	608/609		RO
1 Position Switch	DPS-M/W_	SU	⚡

Set: 43.0

Doors: 238, D-201VV, OH-2, OH-3, OH-4, OH-5, OH-6, OH-7, OH-8, OH-9

1 Hardware

All hardware by others

OT

END OF SECTION

**SECTION 08 8000
GLAZING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Spandrel glazing.
- D. Plastic films.
- E. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 4100 - Millwork: Cabinets with requirements for glass shelves and sliding glass doors.
- B. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 08 1416 - Flush Wood Doors: Glazed lites in doors.
- D. Section 08 4313 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
- E. Section 08 4413 - Glazed Aluminum Curtain Wall: Glazing furnished as part of wall assembly.
- F. Section 10 2800 - Toilet and Bath Accessories: Standard-size, framed Mirrors.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- E. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
- J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- L. GANA (GM) - GANA Glazing Manual; 2009.
- M. GANA (SM) - GANA Sealant Manual; 2008.
- N. ICC (IBC) - International Building Code; 2015.
- O. ITS (DIR) - Directory of Listed Products; current edition.
- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- Q. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies; 2012.
- R. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.

- S. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
- T. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.
- U. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- V. UL 9 - Standard for Fire Tests of Window Assemblies; Current Edition, Including All Revisions.
- W. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- X. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Submit two samples 12 by 12 inch (304.8 by 304.8 mm) in size of glass units.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM) for glazing installation methods.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- C. Laminated Glass: Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.
- D. Heat Soaked Tempered Glass: Provide a five (5) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of

- glass.
1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 3. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
1. In conjunction with vapor retarder and joint sealer materials described in other sections.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.02 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
 2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
 3. Heat-Soak Testing (HST): Provide HST of fully tempered glass used on other demanding applications of project, to reduce risks of spontaneous breakage due to nickel sulfide (NiS) induced fractures in accordance with industry established testing requirements.
 4. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
 2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch (0.762 mm) thick, minimum.

2.03 INSULATING GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 3. Spacer Color: Black.
 4. Edge Seal:
 - a. Color: Black.
 5. Purge interpane space with dry air, hermetically sealed.
- B. Type A - Insulating Glass Units: Vision glass, double glazed.
1. Applications: Exterior glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Outboard Lite: Annealed float glass, or tempered where required by code, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 1) Products:
 - (a) PPG Industries: Solarban 60; www.ppg.com.
 - (b) Guardian Industries: SunGuard SuperNeutral 68; www.guardian.com.
 - (c) Substitution: See Section 01 6000-Product Requirements.

4. Inboard Lite: Annealed float glass, or tempered where required by code, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Low-E, on #4 surface.
 - 1) Products:
 - (a) Pilkington: Energy Advantage; www.pilkington.com.
 - (b) Guardian Industries: IS20; www.guardian.com.
 - (c) Substitution: See Section 01 6000-Product Requirements.
 5. Total Thickness: 1 inch (25.4 mm).
 6. Total Solar Heat Gain Coefficient (SHGC): 25 percent, maximum.
- C. Type B - Insulated Glass Units: Vision glass, double glazed.
1. Applications: Interior vestibule glazing and where otherwise noted in drawings.
 2. Space between lites filled with dry air.
 3. Outboard Lite: Annealed float glass, or tempered where required by code, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 4. Inboard Lite: Annealed float glass, or tempered where required by code, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 5. Total Thickness: 1 inch (25.4 mm).
- D. Type E - Insulating Glass Units: Spandrel glazing.
1. Applications: Exterior spandrel glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
 - a. Tint: Clear.
 - b. Coating: Same as on vision units, on #2 surface.
 4. Inboard Lite: Heat-strengthened or tempered float glass as required by manufacturer, 1/4 inch (6.4 mm) thick.
 - a. Tint: Clear.
 - b. Opacifier: Ceramic frit, on #4 surface.
 - c. Opacifier Color: To be selected by architect from manufacturer's full range.
 5. Total Thickness: 1 inch (25.4 mm).

2.04 GLAZING UNITS

- A. Type D - Monolithic Interior Vision Glazing:
 1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Annealed float glass or fully tempered where required by code.
 3. Tint: Clear.
 4. Thickness: 1/4 inch (6.4 mm), nominal.
- B. Type F - Fire-Protection-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and does not block radiant heat, as required to achieve fire-doors indicated fire-rating period of 90 minutes or less.
 1. See Section 08 8813 - Fire-Resistant Glazing.
- C. Type C - Sound and Safety Glazing: Laminated glass, 2-Ply.
 1. Applications: Locations as indicated on drawings.
 2. Tint: Clear.
 3. Thickness: 1/2 inch (12.7 mm).
 4. Outer Lite: Heat-strengthened glass.
 5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
 6. Inside Lite: Heat-strengthened glass.

2.05 PLASTIC FILMS

- A. GF-1 - Decorative Plastic Film: Polyester type.
 1. Application: Locations as indicated on drawings.

2. Series Type: Frost.
 3. Width: 48 inch (1.2 m).
 4. Products:
 - a. Option 1: 3M; Dusted Crystal, Glass Finish 7725SE-314.
 - b. Option 2: Decorative Films; SX-3140 Dusted Crystal.
- B. Sound Control and Safety Film: Polyvinyl butyral (PVB) type.
1. Glass Type: Laminated safety glazing.
 2. Film Color: Clear.
 3. Manufacturers:
 - a. Kuraray America, Inc; Trosifol Sound Control (SC): www.kuraray.us.com/#sle.
 - b. SEKISUI Chemical Co.: S-LEC Sound Acoustic Film: www.s-lecfilm.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 GLAZING COMPOUNDS

- A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.07 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch (75 mm) long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
- D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
- E. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.02 INSTALLATION, GENERAL

- A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

3.03 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

- E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- F. Carefully trim protruding tape with knife.

3.04 INSTALLATION - BUTT JOINT GLAZING METHOD (SEALANT ONLY)

- A. Application - Exterior and interior locations.
- B. Temporarily brace glass in position for duration of glazing process; mask edges of glass at adjoining glass edges and between glass edges and framing members.
- C. Apply sealant to open side of joint in continuous operation; thoroughly fill joint without displacing foam rod, and then tool sealant surface smooth to concave profile.
- D. Permit sealant to cure then remove foam backer rod, and then apply sealant to opposite side, tool smooth to concave profile.
- E. Remove masking tape.

3.05 INSTALLATION - PLASTIC FILM

- A. Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.
- B. Place without air bubbles, creases or visible distortion.
- C. Install film tight to perimeter of glass and carefully trim film with razor sharp knife. Provide 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) gap at perimeter of glazed panel unless otherwise required. Do not score the glass.

3.06 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.07 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

**SECTION 08 8813
FIRE-RESISTANT GLAZING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes the fire rated glass and temperature rise framing.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM E-119 Methods for Fire Test of Building Construction and Materials
 - 2. ASTM E2074-00 Methods for Fire Tests of Door Assemblies
 - 3. ASTM E2010-01 Methods for Fire Tests of Window Assemblies
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 80 Fire Doors and Windows
 - 2. NFPA 251 Fire Tests of Building Construction and Materials
 - 3. NFPA 252 Fire Tests of Door Assemblies
 - 4. NFPA 257 Fire Tests of Window Assemblies
- C. Underwriters Laboratories
 - 1. UL9 Fire Tests of Window Assemblies
 - 2. UL10c Positive Pressure Fire Test of Window & Door Assemblies
 - 3. UL263 Fire Tests of Building Construction and Materials
- D. Consumer Product Safety Commission (CPSC)
 - 1. 16 CFR 1201 Safety Standard for Glazing Materials

1.03 RELATED SECTIONS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 1416 - Flush Wood Doors.
- C. Section 08 1613 - Fiberglass Reinforced Plastic Doors.
- D. Section 08 7100 - Door Hardware.
- E. Section 08 8000 - Glazing: For non-fire-rated glazing and 20 minute fire-rated glazing.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 3000 - Administrative Requirements.
- B. Shop Drawings: Submit shop drawings showing layouts, profiles, and product system components.
- C. Samples: Submit samples for finishes colors and textures.
- D. Technical Information: Submit latest edition of product data providing product description, technical data and installation instructions.

1.05 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Product Requirement Section.
- B. Delivery: Deliver materials to specified destination in manufacturer or distributor's packaging undamaged and complete with installation instructions.
- C. Storage and Protection: Store off ground, under cover, protected from weather and construction activities.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Use 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 proper performance of the work of this Section.
- B. Manufacturer Qualifications: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of

successful production acceptable to the Architect.

1.07 WARRANTY

- A. Manufacturers 5 year warranty.
 - 1. Warranty begins at date of substantial completion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Glass: For use at 60 minute rated doors meeting ASTM E-119 "Barrier to Radiant Heat" (GL-3F):
 - 1. SGG Contraflam 60, as manufactured by Vetrotech Saint-Gobain NA, Auburn, WA 98001 Telephone 888-803-9533 Fax 253-333-5166 Similar products properly submitted and approved may be considered equal.
 - 2. Properties:
 - a. Thickness: 1" (25 mm)
 - b. Fire-Rating: 60 minutes (with Hose Stream test)
 - c. Weight: 11.0 lbs/sf.
 - d. Approx. visible light transmission: 82%
 - e. Impact Safety Rating: ANSI Z97.1 & CPSC 16CFR1201 (CAT I & II)
 - 3. Labeling: Each lite of SGG Contraflam 60 shall be labeled with a permanent logo including the name of the product, manufacturer, testing laboratory (ITS / Warnock Hersey & / or Underwriters Laboratories (UL), fire rating period and safety glazing standards.
 - 4. Fire Rating: Fire Rating listed and tested by ITS / Warnock Hersey and/or underwriters Laboratories (UL) for fire rating scheduled at opening locations in drawings, when tested in accordance with (ASTM E-2010) (ASTM E2074) (ASTM E119) (UBC Standards 7-2 & 7-4) (UL9 & UL10c) (UL 263) (NFPA 252 & 257) (NFPA 251).
- B. Glass: For use at 90 minute rated doors and transparent wall assemblies.
 - 1. SGG Keralite FR-F as manufactured by Vertrotech Saint-Gobain NA. Similar products properly submitted and approved may be considered equal.
 - 2. Properties:
 - a. Thickness: 3/16" (5 mm).
 - b. Fire-Rating: 90 minutes.
 - c. Weight: 2.7 lbs/sf.
 - d. Approximate visible light transmission: 85%.
 - e. Impact Safety Rating: ANSI Z97.1 & CPSC 16CFR1201 (CAT I & II).
 - f. Film: 3M Scotchshield Ultra Safety Film (on one surface).
 - 3. Labeling: Each lite of SGG Keralite FR-R shall be labeled with a permanent logo including the name of the product, manufacturer, testing laboratory (ITS, Warnock Hersey or UL), fire rating period and safety glazing standards.
 - 4. Fire Rating: Fire Rating listed and tested by ITS, Warnock Hersey or Underwriters Laboratories (Listing #R14515) for fire rating scheduled at opening locations in drawings, when tested in accordance with (ASTM E-163) (ASTM E-152) (UBC Standards 7-2 & 7-4) (UL9 & UL10c) (NFPA 252 & 257).
- C. Frames: VDS - temperature rise framing systems for 1 hour and 2 hour fire walls meeting ASTM E-119 'Barrier to Radiant Heat'.
 - 1. VDS Framing System, as fabricated and distributed by: Vetrotech Saint-Gobain. Similar products properly submitted and approved may be considered equal.
 - 2. Properties
 - a. Steel profiles mechanically joined with steel pins.
 - b. Insulation: Insulate framing system against effects of fire and heat from either side. Insulate steel tubes incorporating calcium silicate material. Perimeter of framing system to the rough opening shall be firmly packed with mineral wool fire stop insulation or intumescent sealant.
 - c. Glazing beads: Proprietary steel beads as recommended by manufacturer to comply with listing.

- d. Fasteners: As recommended by manufacturer.
 - e. Glazing accessories: Glazing pocket shall be lined with intumescent tape as supplied by manufacturer. SGGCONTRAFLAM-N2 fire rated glass shall be set on calcium silicate / hardwood / neoprene / setting block.
 - f. Glazing Compounds: SGGCONTRAFLAM-2 shall be glazed with approved chloroprene vinyl (as supplied by manufacturer), closed cell PVC foam tape or pure silicone sealant.
- 3. Listing / Labeling
 - a. Certification: System tested in accordance with ASTM E-119, NFPA 251, UBC 7-1, UL 263. Temperature on the non-fire side of the system at the conclusion of fire test shall be below 250 F above ambient room temperature.
 - b. Fire testing shall be conducted by an approved independent test laboratory similar to Intertek Testing Services (Warnock-Hersey) or Underwriters Laboratories, Inc. (UL).
 - 4. Fabrication
 - a. Framing assemblies shall be furnished welded when possible. Frames deemed too large for shipping and handling purposes shall be furnished knocked down for field assembly with suitable fasteners for final fabrication.
 - b. Frame assemblies shall be field glazed.
 - c. Obtain approved shop drawings prior to fabrication.
 - 5. Finishing
 - a. Steel frames shall have one coat of manufacturer approved rust inhibitor (primer).
 - b. Factory applied finish per architect's specifications and applied in accordance with manufacturers standard specifications.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of site conditions: Examine substrate conditions and members to which the work of this section attaches to.
- B. Openings shall be plumb, square and within allowable tolerance.
- C. Notify architect to any discrepancies and do not proceed until such conditions are corrected.

3.02 INSTALLATION

- A. System shall be installed by a specialty contractor with appropriate experience and qualifications; and in strict accordance with approved shop drawings. Only experienced mechanics familiar with this type of work shall be employed.
- B. Field cutting or modification of glazing materials in not permitted.

3.03 PROTECTION & CLEANING

- A. Protect glass from contract with contaminating substances resulting from construction operations, such as welding splatter.
- B. Remove any temporary coverings and protection of adjacent work areas.
- C. Clean installed products in accordance with manufacturer's instructions prior to owner' acceptance.
- D. Remove construction debris from project site and legally dispose of.

END OF SECTION

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**SECTION 09 2116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Acoustic insulation.
- C. Gypsum sheathing.
- D. Tile backing board.
- E. Gypsum wallboard.
- F. Joint treatment and accessories.
- G. Adjustable Partition Closures.

1.02 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing: Steel stud framing.
- B. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 07 2100 - Thermal Insulation: Top of wall insulation between flutes of steel decking.
- D. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.
- E. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire rated walls.
- F. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- D. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- E. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- F. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- G. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing Board; 2013.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- J. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- K. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- L. GA-216 - Application and Finishing of Gypsum Board; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, glass mat faced gypsum board, accessories, joint finishing system, and aluminum reveal moldings, and adjustable partition closures.

- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions: 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.
- C. Fire Rated Assemblies: Provide completed assemblies identical to assemblies tested according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

2.02 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company: www.americangypsum.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. Georgia-Pacific Gypsum: www.gpgypsum.com.
 - 4. Lafarge North America Inc: www.lafargenorthamerica.com.
 - 5. National Gypsum Company: www.nationalgypsum.com.
 - 6. USG Corporation: www.usg.com.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
 - b. Mold resistant board is required at all restrooms walls where tile is not covering the wall.
 - 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. Thickness:
 - a. Vertical Surfaces: 5/8 inch (16 mm) unless noted otherwise.
 - b. Ceilings: 5/8 inch (16 mm) unless noted otherwise.
- C. Impact Resistant Wallboard:
 - 1. Application: Common spaces for assembly, community and circulation spaces such as but not limited to multi-purpose, prefunction, conference, elevator lobbies, corridors, studies, custodial break, huddle rooms, and pocket areas. Installed to a height of 48 inches.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Type: Fire resistance rated Type X, UL or WH listed.
 - 4. Thickness: 5/8 inch (16 mm) unless noted otherwise.
 - 5. Edges: Tapered.
- D. Backing Board For Tiled Surfaces:
 - 1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Applications: Wet Areas.

- b. Regular Type: Thickness 1/2 inch (12.7 mm).
 - c. Fire Resistant Type: Type X core, thickness 5/8 inch (16 mm).
- E. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Ceilings, unless otherwise indicated.
 - 2. Thickness: 5/8 inch (16 mm).
 - 3. Edges: Tapered.
- F. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
 - 1. Application: Exterior sheathing, unless otherwise indicated.
 - 2. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 - 3. Type X Thickness: 5/8 inch (16 mm).
 - 4. Edges: Square.
 - 5. Glass Mat Faced Products:
 - a. CertainTeed Corporation; GlasRoc Brand.
 - b. Georgia-Pacific Gypsum; DensGlass Sheathing.
 - c. National Gypsum Company; Gold Bond eXP Sheathing.
 - d. USG Corporation; Securock Glass Mat Sheathing.
 - e. Or equal.
- G. Shaftwall and Coreboard: Type X; 1 inch (25 mm) thick by 24 inches (610 mm) 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.

2.03 GYPSUM WALLBOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3.5 or 6 inch (88.9 or 152.4 mm), full depth of stud.
- B. Water-Resistive Barrier: As specified in Section 07 2500.
- C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide L-bead at exposed panel edges.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- E. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- F. Sill Sealer: 1/4 inch (6 mm) thick, plate width, closed cell plastic foam from continuous rolls.
- G. Control Joints: Shall be USG No. 093. Provide as required to prevent cracking and at locations noted in drawings.
- H. Adjustable Partition Closure: See drawings for sizes and locations.
 - 1. Acoustic Joint Filler and Partition Closure.
 - 2. Acceptable Products:
 - a. Mullion Mate, Acoustic, by Gordon, Inc: www.gordon-inc.com/interiors/ceilings/mullionmate.aspx.
 - b. Quiet Joint, by EMSeal: www.emseal.com/product/quietjoint-acoustic-joint-filler/.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

- A. Shaft walls shall be USG-750302 or approved equal 2 hour rated fire barriers. Include the following components as per United States Gypsum Design.
 - 1. 25 gauge CH studs @ 24" oc.
 - 2. 2 layers 1/2" gypsum board firecode C.
 - 3. 1" gypsum liner panels.
 - 4. Fire caulking as required.
- B. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
- C. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
 - 1. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation:
 - 1. Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
 - 2. Install above top runner track between flutes of steel decking at all partions and walls except at fire-rated construction.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

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.
- B. Single-Layer Non-Rated: Install gypsum board horizontally, with ends and edges occurring over firm bearing. Extend partition board installation to structure above in all locations.
- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
 - 1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
- F. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.
 - 2. At exterior soffits, not more than 30 feet (10 meters) apart in both directions.
 - 3. Verify locations with Architect.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 3. Level 1: All wall areas above finished ceilings, including fire rated walls, whether or not accessible in the completed construction.
- D. 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 (0.8 mm).
- E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

END OF SECTION

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**SECTION 09 3000
TILING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Non-ceramic trim.
- D. Sealant at tile-to-tile interior corners.

1.02 RELATED REQUIREMENTS

- A. Section 07 1300 - Sheet Waterproofing.
- B. Section 07 9200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).; 2017.
- B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
- C. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- D. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement; 1999 (Reaffirmed 2010).
- E. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.
- F. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
- G. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- H. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
- I. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
- J. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).
- K. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).
- L. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior glue plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
- N. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2017.

- O. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).
- P. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Revised).
- Q. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation; 2014.
- R. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installation; 2014.
- S. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2013.1.
- T. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Verification Samples: Provide one full size sample of each size and color. Provide multiple samples if necessary to show color and/or texture variations.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- E. 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 Tile: 5 percent of each size, color, and surface finish combination, but not less than 100 square feet of each type.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136 and TCNA (HB) on site.
- B. Installer Qualifications:
 - 1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F (10 degrees C) and below 100 degrees F (38 degrees C) during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

- A. Ceramic and Porcelain Tile: ANSI A137.1 standard grade.
 - 1. Option 1:
 - a. TL-1/TLB-1:
 - 1) Product: Ceramic Tile Works - Multiform Carbone.
 - 2) Size: 12" x 24" and 6" x 24" cut tile base.
 - 3) Install: Stack Bond.
 - 4) Location: Restroom Floor Tile and Base.
 - 5) Grout: Mapei - 5019 Pearl Gray.

- b. TL-2:
 - 1) Product: Daltile - Mythology Rectangle Undulated, Santorini MY90 Glossy.
 - 2) Size: 4" x 12".
 - 3) Install: Reference enlarged wall tile patterns.
 - 4) Location: Restroom Wall Tile.
 - 5) Grout: Mapei - 5103 Cobblestone.
- c. TL-3:
 - 1) Product: Daltile - Mythology Rectangle Wave Crest, Santorini MY90 Glossy.
 - 2) Size: 4" x 12".
 - 3) Install: Reference enlarged wall tile patterns.
 - 4) Location: Restroom Wall Tile.
 - 5) Grout: Mapei - 5103 Cobblestone.
- d. TL-4:
 - 1) Product: Daltile - Mythology Rectangle Undulated, Cyclade MY94 Glossy.
 - 2) Size: 4" x 12".
 - 3) Install: Reference enlarged wall tile patterns.
 - 4) Location: Restroom Wall Tile.
 - 5) Grout: Mapei - 5103 Cobblestone.
- e. TL-5:
 - 1) Product: Daltile - Color Wheel Mosaic, Mustard 1012 Glossy.
 - 2) Size: 1" x 6" Mosaic.
 - 3) Install: Stack Bond.
 - 4) Location: Work Cafe, Dean's Suite.
 - 5) Grout: Mapei - 5103 Cobblestone.
- f. TL-6:
 - 1) Product: Ceramic Tile Works - Multiforme, Calce Matte.
 - 2) Size: 12"x24".
 - 3) Install: Stack Bond.
 - 4) Location: Reflection Space.
 - 5) Grout: Mapei - 5103 Cobblestone.
- 2. Option 2:
 - a. TL-1/TLB-1:
 - 1) Product: Daltile - Cohesion, Dark Grey C026 Matte.
 - 2) Size: 12"x24".
 - 3) Install: Stack Bond.
 - 4) Location: Restroom Floor Tile and Base.
 - 5) Grout: Mapei - 5019 Pear Gray.
 - b. TL-2:
 - 1) Product: Tile x Design - Marea, Bianco Matt MAR101M.
 - 2) Size: 3"x12".
 - 3) Install: Reference enlarged wall tile patterns.
 - 4) Location: Restroom wall tile.
 - 5) Grout: Mapei - 5103 Cobblestone.
 - c. TL-3:
 - 1) Product: Tile x Design - Marea, Bassa Bianco, Lucido MAR113L.
 - 2) Size: 3"x12".
 - 3) Install: Reference enlarged wall tile patterns.
 - 4) Location: Restroom wall tile.
 - 5) Grout: Mapei - 5103 Cobblestone.
 - d. TL-4:
 - 1) Product: Tile x Design - Marea, Smeraldo Matt MAR122M.
 - 2) Size: 3"x12".
 - 3) Install: Reference enlarged wall tile patterns.
 - 4) Location: Restroom wall tile.

- 5) Grout: Mapei - 5103 Cobblestone.
- e. TL-5:
 - 1) Product: Fireclay Tile - Sunflower.
 - 2) Size: 2"x6".
 - 3) Install: Stack Bond.
 - 4) Location: Work Cafe, Dean's Suite.
 - 5) Grout: Mapei - 5103 Cobblestone.
- f. TL-6:
 - 1) Product: Daltile - Cohesion, White C020 Matte.
 - 2) Size: 12"x24".
 - 3) Install: Stack bond.
 - 4) Location: Reflection Space.
 - 5) Grout: Mapei - 5103 Cobblestone.

2.02 TRIM AND ACCESSORIES

- A. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Open edges of wall tile.
 - b. Open edges of floor tile.
 - c. Wall tile to Floor tile.
 - d. Wall corners, outside (sealant at inside corners).
 - e. Transition between floor finishes of different heights.
 - f. Floor to wall joints.
 - 2. Manufacturers:
 - a. Schluter-Systems: www.schluter.com.
 - b. Genesis APS International: www.genesis-aps.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
 - 3. Flooring and/or Wall Finish Transitions:
 - a. SL-1: Schluter - Jolly, Satin Anodized Aluminum AE; Application: Outside corners of tile.
 - b. SL-2: Schluter - Dilex, Satin Anodized Aluminum AE; Application: Wall tile to floor tile.
 - c. SL-3: Schuler - Vinpro-U, Satin Anodized Aluminum AE; Application: Floor material transitions at elevation differences.
 - d. SL-4: Schuler - Schiene, Satin Anodized Aluminum AE; Application: Floor material transitions.

2.03 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
 - 1. ARDEX Engineered Cements: www.ardexamericas.com.
 - 2. Bostik Inc: www.bostik-us.com.
 - 3. LATICRETE International, Inc: www.laticrete.com.
 - 4. Mapei Corporation: www.mapei.com.
 - 5. Merkrete, by Parex USA, Inc: www.merkrete.com.
 - 6. ProSpec, an Oldcastle brand: www.prospec.com.
 - 7. TEC, an H.B. Fuller Construction Products Brand: www.tecspecialty.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- C. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.

2.04 GROUTS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
 - 1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.

2. Bostik Inc: www.bostik-us.com/#sle.
 3. LATICRETE International, Inc: www.laticrete.com/#sle.
 4. Mapei Corporation: www.mapei.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- C. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
 2. Use sanded grout for joints 1/8 inch (3.2 mm) wide and larger; use unsanded grout for joints less than 1/8 inch (3.2 mm) wide.
 3. Color(s): As selected by Architect from manufacturer's full line.
- D. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Applications: Install in all toilet rooms.
 2. Color(s): As selected by Architect from manufacturer's full line.

2.05 ACCESSORY MATERIALS

- A. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Crack Resistance: No failure at 1/16 inch (1.6 mm) gap, minimum; comply with ANSI A118.12.
 2. Fluid or Trowel Applied Type:
 - a. Material: Synthetic rubber or Acrylic.
 - b. Thickness: 25 mils (0.6 mm), minimum, dry film thickness.
- B. Waterproofing Membrane at Walls: Polyethylene membrane, with polypropylene fleece laminated on both sides; complying with ANSI 118.10,
1. Applications: Waterproofing Membrane at renovated toilet rooms as required.
 2. Product: Schluter KERDI, or equal.
 - a. Substitutions: See Section 01 6000 - Product Requirements.
- C. Self Leveling Underlayment mixed with water to produce a free flowing, fast setting cementitious underlayment which can be poured from feather edge to 1-1/4 inch thick in one pour.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
1. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19 , manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control and expansion joints free of mortar, grout, and adhesive.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
 - 1. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.
 - 2. Where epoxy or furan grout is indicated, but not epoxy or furan bond coat, install in accordance with TCNA (HB) Method F115.

3.05 INSTALLATION - WALL TILE

- A. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.
- B. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.
- C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

**SECTION 09 5100
ACOUSTICAL CEILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system and coordinating trim pieces.
- B. Acoustical ceiling tiles.

1.02 RELATED REQUIREMENTS

- A. Section 21 1300 - Fire-Suppression Sprinkler Systems: Sprinkler heads in ceiling system.
- B. Section 23 3700 - Air Outlets and Inlets: Air diffusion devices in ceiling.
- C. Section 26 5100 - Interior Lighting: Light fixtures in ceiling system.

1.03 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; 2015.
- B. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- 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; 2014.
- E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- F. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.04 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.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Samples: Submit one sample illustrating material and finish of acoustical units.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Acoustical Units: Quantity equal to 5 percent of total installed of each type.

1.06 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.

1.07 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.

2. CertainTeed Corporation: www.certainteed.com.
 3. USG Corporation: www.usg.com/ceilings.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Suspension Systems:
1. Armstrong World Industries, Inc: www.armstrongceilings.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. USG Corporation: www.usg.com/ceilings.
 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACOUSTICAL CEILING TILES

- A. Acoustical Ceiling Tiles - General: ASTM E 1264, Class A.
- B. Acoustical Tile (ACT-1): Painted Mineral Fiber with the following characteristics.
1. Size: 24 by 24 inches (600 by 600 mm).
 2. Thickness: 3/4 inches.
 3. Edge: Square Tegular.
 4. Surface Color: White.
 5. Basis of Design: ULTIMA Tegular WH 1911HRC by Armstrong, or equal.
 6. Suspension System: 15/16" Exposed Tee, to match ceiling tile.

2.03 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
1. Materials:
 - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
 - b. Aluminum Grid: Aluminum sheet, ASTM B209 (ASTM B209M).
- B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; intermediate-duty.
1. Finish: White painted.
 2. Basis of Design: Armstrong -Prelude XL 15/16", or equal.
 - a. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Hanger Wire: 12-gage 0.08 inch (2 mm) galvanized steel wire.
- C. Hold-Down Clips: Product CHDC by Armstrong, or approved equal, at Vestibules.
- D. Perimeter Moldings: Same metal and finish as grid.
1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
 2. Other accessory pieces as detailed or as required for a complete installation.
- E. Perimeter Trim: Type and color to coordinate with ceiling grids.
1. Product: Armstrong - AXIOM Classic, or equal.
 - a. Application: Use at ACT to ACT transition where elevation change equals 16 inches.
 2. Product: Armstrong - AXIOM Transitions, or equal.
 - a. Application: Use at ACT to ACT transitions where elevation change equals less than 16 inches.
 3. Color: White.
- F. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.
- G. Touch-up Paint: Type and color to match acoustical and grid units.
- H. Provide "Unistrut" type support for suspended ceilings in areas where ductwork or other obstructions will interfere with the ceiling suspension system.

1. Carriers shall be a minimum of 1-5/8".
2. Provide bars and fasteners as required for a complete installation.
3. See Reflected Ceiling Plans and Mechanical drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, ASTM C 636/C 636M, ASTM E 580/E 580M, ASTM C 636/C 636M, and ASTM E 580/E 580M and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 1. Use longest practical lengths.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Do not attach hangars to steel roof deck or steel deck tabs. Attach hangars to structural members.
- G. Suspension System, Non-Seismic: 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.
- H. 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.
- I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- J. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
- K. Do not eccentrically load system or induce rotation of runners.
- L. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 1. Install with continuous gasket.
- M. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch (25 mm) movement. Maintain visual closure.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 1. Cut to fit irregular grid and perimeter edge trim.
 2. Make field cut edges of same profile as factory edges.
 3. Double cut and field paint exposed reveal edges.

G. Install hold-down clips on panels within 20 ft (6 m) of an exterior door.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

**SECTION 09 6500
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Rubber Flooring.
- C. Resilient base.
- D. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- B. ASTM F1344 - Standard Specification for Rubber Floor Tile; 2015.
- C. ASTM F1700 - Standard Specification for Solid Vinyl Tile; 2013a.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
- E. ASTM F2169 - Standard Specification for Resilient Stair Treads; 2015.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Verification Samples: Submit two samples, 6 by 6 inches in size illustrating color and pattern for each resilient flooring product specified.
- D. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- E. Maintenance Data: Include maintenance procedures and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Materials: Quantity equivalent to 5 percent of each type and color.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

1.07 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 PRODUCTS

2.01 TILE FLOORING

- A. Rubber Floor Tile (RF-1): ASTM F1344 Type 1 and Grade 1; Homogeneous rubber compound with a random scattered design.
 - 1. Option 1:
 - a. Product: Interface - Noraplan Sentica, Frost Bite 6524.
 - b. Size: 24 by 24 inches.
 - c. Thickness: 2 mm.
 - d. Surface: Smooth.
 - e. Note: Weld rods to match.
 - 2. Option 2:
 - a. Product: American Biltrite - AB PURE, Gainesboro Valley ABT-31.
 - b. Size: 35 by 35 inches.
 - c. Thickness: 2 mm.
 - d. Surface: Smooth.
 - e. Note: Weld rods to match.
- B. Luxury Vinyl Tile (LVT-1): Printed film type, with transparent or translucent wear layer; Comply with ASTM F1700, of class corresponding to type specified.
 - 1. Option 1:
 - a. Product: Patcraft - Pursue, Authentic 00120-V2.
 - b. Size: 7 by 47 inches.
 - c. Install: Brick.
 - 2. Option 2:
 - a. Product: Shaw Contract - Abide, Maize Wenge 07210.
 - b. Size: 7 by 47 inches.
 - c. Install: Brick.
- C. Luxury Vinyl Tile (LVT-2): Printed film type, with transparent or translucent wear layer; Comply with ASTM F1700, of class corresponding to type specified.
 - 1. Option 1:
 - a. Product: Patcraft - Shape Study Graph 1713V, Stone-V2 00500.
 - b. Size: 24 by 24 inches.
 - c. Install: Quarter turn.
 - 2. Option 2:
 - a. Product: Tarkett - Event+ Abstract, Chantilly 11194.
 - b. Size: 12 by 24 inches.
 - c. Install: Brick.

2.02 STAIR COVERING

- A. Stair Treads with Integral Risers (RST-2): Rubber; full height of riser, full width and depth of tread in one piece; tapered thickness.
 - 1. Manufacturers:
 - a. Burke Flooring; Rouleau Stair Treads with Integral Risers: www.burkeflooring.com/#sle.
 - b. Johnsonite, a Tarkett Company; _____: www.johnsonite.com.
 - c. Roppe Corp; _____: www.roppe.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Minimum Requirements: Comply with ASTM F2169, Type TS, rubber, vulcanized thermoset.

3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
4. Nosing: Square.
5. Color: To be selected by Architect from manufacturer's full range.

2.03 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style A (straight) at carpet and Style B (coved) at hard surface.
 1. Manufacturers:
 - a. Burke Flooring; Commercial Wall Base - TS: www.burkeflooring.com/#sle.
 - b. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
 - c. Roppe Corp: www.roppe.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 2. Height: 4 inch (100 mm).
 3. Thickness: 0.125 inch (3.2 mm).
 4. Finish: Satin.
 5. Length: Roll.
 6. Profile: Straight profile at carpet and portal locations, coved profile at all other locations.
 7. Color:
 - a. RB-1: Johnsonite - 63 Burnt Umber.
 - b. RB-2: Johnsonite - 48 Grey.
 - c. RB-3: Johnsonite - TA5 Colonial Gray.

2.04 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Same material as flooring.
- D. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- B. Prohibit traffic until filler is fully cured.
- C. Clean substrate.
- D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.

- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 - 1. Spread only enough adhesive to permit installation of materials before initial set.
 - 2. Fit joints and butt seams tightly.
 - 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- C. Install tile pattern starting at the center of the room and working towards the walls. All tile shall be laid with pattern running one way. Confirm tile placement regarding pattern direction with architect prior to application. See floor plan for floor/color patterns to be provided.

3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.
- B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.06 INSTALLATION - STAIR COVERINGS

- A. Install stair coverings in one piece for full width and depth of tread.
- B. Adhere over entire surface. Fit accurately and securely.

3.07 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.08 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

**SECTION 09 6623
EPOXY TERRAZZO FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Epoxy matrix terrazzo with ground and polished finish.
- B. Divider and transition strips.
- C. Epoxy terrazzo wall base.
- D. Precast epoxy terrazzo stair units.
- E. Moisture mitigation.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete subfloor with steel trowel finish.
- B. Section 07 9200 - Joint Sealants: Sealing joints between terrazzo work and adjacent construction and fixtures.
- C. Section 12 4813 - Entrance Floor Mats and Frames: Recessed floor mat frames.

1.03 REFERENCE STANDARDS

- A. NTMA (GRAD) - Aggregate Gradation Standards; The National Terrazzo and Mosaic Association, Inc.; current edition.
- B. NTMA (EPOXY) - Epoxy Terrazzo Specifications; The National Terrazzo and Mosaic Association, Inc.; Current Edition located at www.ntma.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for divider strips, control joint strips, expansion joints, and sealer; include printed copy of current NTMA recommendations for type of terrazzo specified.
- C. Shop Drawings: Indicate divider strip and control and expansion joint layout, and details of adjacent components. For precast units, detail profile and anchorage requirements.
- D. Samples: Submit two samples, 8 inch (203.2 mm) by 8 inch (203.2 mm) in size illustrating color, chip size and variation, chip gradation, matrix color, and typical divider strip.
- E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- F. Cleaning and Maintenance Data: Include procedures for stain removal, stripping, and sealing.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with NTMA recommendations as posted at their web site at www.ntma.com.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section.
 - 1. Minimum five years of documented experience.
- C. Installer Qualifications: Company specializing in performing the type of work specified in this section.
 - 1. Minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store terrazzo materials in a dry, secure area.
- B. Maintain minimum temperature of 60 degrees F (16 degrees C).
- C. Keep products away from fire or open flame.

1.07 FIELD CONDITIONS

- A. Do not install terrazzo when temperature is below 50 degrees F (10 degrees C) or above 90 degrees F (32 degrees C).

- B. Maintain temperature within specified range 24 hours before, during, and 72 hours after installation of flooring.
- C. Provide ambient lighting level of 50 ft candles (540 lx), measured at floor surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Epoxy Matrix Terrazzo:
 - 1. Key Resin Company; Key Epoxy Terrazzo: www.keyresin.com.
 - 2. Sherwin-Williams Company; General Polymers Brand; Terrazzo 1100: www.generalpolymers.com.
 - 3. Terrazzo & Marble Supply Companies; Terroxy Resin Systems: www.tmsupply.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EPOXY MATRIX TERRAZZO APPLICATIONS

- A. Floors:
 - 1. Thickness: 3/8 inch (9 mm), nominal.
 - 2. Aggregate Type: Marble chips.
 - 3. Aggregate Size: No. 1 and 2.
- B. Wall Base: Precast epoxy terrazzo.
 - 1. Height: 4 inch.
 - 2. Thickness: 3/8 inch (9 mm), minimum.
 - 3. Style: Coved.
 - 4. Color(s): Same as adjacent floor.
 - 5. Aggregate Type and Size: Same as floors.
- C. Precast Stairs - Treads: Precast epoxy terrazzo.
 - 1. Thickness: 1-1/2 inch (38 mm), minimum.
 - 2. Color(s): Same as adjacent floor.
 - 3. Aggregate Type and Size: Same as floors.

2.03 EPOXY MATRIX TERRAZZO

- A. Floors: Epoxy matrix, 3/8 inch (9 mm) thick.
 - 1. Base Color: Two colors shall be provided. Custom blend.
 - a. TZ-1: Custom Blend TM#23-2754, as manufactured by Terroxy.
 - b. TZ-2: Custom Blend TM#23-2755, as manufactured by Terroxy.
 - 2. Primer: 3579 LV Low viscosity low modulus epoxy.
 - 3. Binder Resin: 3520 epoxy terrazzo matrix.
 - 4. Filler: 5270 epoxy filler.
 - 5. Marble Chips: #1 and #2.
 - 6. Grout: 3520G epoxy terrazzo grout.
 - 7. Grout Filler: 5290 grout filler or 5270 epoxy filler.
 - 8. Sealer: Terroxy WB Urethane Sealer.

2.04 MATERIALS

- A. Epoxy Matrix Terrazzo: Aggregate and matrix mix applied to substrate, troweled flat, and ground smooth.
- B. Matrix: Two component resin and epoxy hardener with mineral filler and color pigment, non-volatile, thermo-setting.
- C. Aggregate: Type as indicated; sized in accordance with NTMA aggregate gradation standards; color(s) as indicated, uniform in color.
- D. Finishing Grout: Epoxy, color to match terrazzo matrix.
- E. Precast Epoxy Terrazzo Stair Units: Fabricate to sizes and profiles indicated on drawings.
 - 1. Reinforce units as required by unit sizes, profiles, and thicknesses as recommended by manufacturer.

2. Finish exposed-to-view edges and reveals to mach face finish.
 - a. Ease exposed edges to 1/8 inch radius.
 3. Abrasive Strips: Two line abrasive nosing strip inserts at nosing.
 - a. Material: Silicon carbide or aluminum oxide in epoxy resin binder set in a channel.
 - b. Width: 1/2 inch.
 - c. Length: 4 inches less than stair width.
 - d. Color: Black.
- F. Aggregate: Crushed marble, size in accordance with NTMA Plate of standard gradation and uniform coloration.

2.05 ACCESSORIES

- A. Divider Strips: 1/8 inch (3 mm) or 1/4 inch (6 mm) thick zinc exposed top strip, zinc coated steel concealed bottom strip, with anchoring features.
- B. Control Joint Strips: 1/8 inch (3 mm) nominal width zinc exposed top strips, zinc coated steel concealed bottom strips, 1/8 inch (3 mm) wide flexible epoxy strip between vertical strips, with anchoring features.
- C. Divider and Control Joint Strip Height: To suit thickness of terrazzo topping, with allowance for grinding.
- D. Base Cap, Base Divider Strip, and Separator Strip: Match divider strips.
- E. Transition Strips - Type as recommended by NTMA, to be used along terrazzo edges abutting a lower floor finish (concrete, fluid-applied coating, etc.)
- F. Isolation membrane: Terroxy 400 mil. flexible epoxy membrane.
- G. Non-Slip Inserts at Stair Treads: Zinc, 3/8 x 3/8 inches (9 x 9 mm) x 20 gage (0.9 mm) dove-tail shaped channels, with anchors, filled with aluminum oxide non-slip filler.
- H. Anchors and Reinforcement for Precast Units: As recommended by manufacturer for type of installation.
- I. Sealer: Colorless, non-yellowing, penetrating liquid type to completely seal matrix surface; not detrimental to terrazzo components.
- J. Primer: 3579 LV Low viscosity low modulus epoxy.
- K. Moisture Mitigation: Two-component, high solids, moisture tolerant, high density, low odor, epoxy-based product produced by epoxy terrazzo resin manufacturer specifically recommended to reduce alkalinity levels and moisture emission to acceptable levels.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive terrazzo.
- B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.
- C. Verify that concrete sub-floor surfaces are ready for terrazzo installation by testing for moisture vapor emission, internal relative humidity, and alkalinity; obtain instructions if test results are not within limits recommended by terrazzo materials manufacturer.

3.02 PREPARATION

- A. Clean substrate of foreign matter.
- B. Apply primer in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install moisture mitigation as required.
- B. Install divider and control joint strips straight and flat to locations indicated.
- C. Install non-slip inserts in floors and stair treads where indicated.

- D. Install recessed floor mat frames.
- E. Install base and border divider and control joint strips to match floor pattern.
- F. Install terminating cap strip at top of base; attach securely to wall substrate.
- G. Place terrazzo mix over substrate to thickness indicated.
- H. Anchor precast units as indicated on drawings.
- I. Install precast units using specified setting material.

3.04 FINISHING

- A. Finish terrazzo to match architects approved samples.
- B. Grind terrazzo surfaces with power disc machine; sequence with coarse to fine grit abrasive, using a wet method or using a dry grinder with vacuum to control dust.
- C. Apply grout to fill voids exposed from grinding.
- D. Remove grout coat by grinding, using a fine grit abrasive.

3.05 TOLERANCES

- A. Maximum Variation from Flat Surface: 1/4 inch in 10 feet (6 mm in one m).
- B. Maximum Variation from Level (Except Surfaces Sloping to Drain): 1/8 inch (3 mm).

3.06 CLEANING

- A. Scrub and clean terrazzo surfaces with neutral pH cleaner in accordance with manufacturer's instructions. Let dry.
- B. Immediately after terrazzo has dried, apply sealer in accordance with manufacturer's instructions.
- C. Polish surfaces in accordance with manufacturer's instructions.

3.07 PROTECTION

- A. Protect finished terrazzo from damage due to subsequent construction until Date of Substantial Completion.

END OF SECTION

**SECTION 09 6700
FLUID-APPLIED FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fluid-applied flooring and base.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete
- B. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

- A. ASTM C 307 - Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
- B. ASTM C 413 - Absorption of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing.
- C. ASTM C 579 - Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- D. ASTM D 696 - Coefficient of Linear Thermal Expansion of Plastics.
- E. ASTM D 2240 - Rubber Property - Durometer Hardness.
- F. ASTM D 4258 - Surface Cleaning Concrete for Coating.
- G. ASTM D 4259 - Abrading Concrete.
- H. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- I. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.
- J. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.
- C. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section.
 - 1. Minimum 3 years of documented experience.
 - 2. Approved by material manufacturer.

1.06 MOCK-UP

- A. Construct mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
 - 1. Number of Mock-Ups to be Prepared: One.
 - 2. Use same materials and methods for use in the work.

3. Locate where directed.
 4. Minimum Size: 48 inches by 48 inches (1220 mm by 1220 mm).
- B. Obtain approval of mock-up by Architect before proceeding with work.
- C. Approved mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.08 FIELD CONDITIONS

- A. Maintain minimum temperature in storage area of 55 degrees F (13 degrees C).
- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fluid-Applied Flooring:
1. Sherwin-Williams Company: General Polymers Brand: www.generalpolymers.com.
 2. Sika Corporation: www.sikafloorusa.com.
 3. Tremco: www.tremcosealants.com.
 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FLUID-APPLIED FLOORING SYSTEMS

- A. Fluid-Applied Flooring (FAF-1):
1. Basis of Design: Sherwin Williams ResuFlor Deco Quartz DB23
 2. First Broadcast Coat with decorative quartz broadcast: Resuflor MPE, 10-12 mils.
 3. Second Broadcast Coat with decorative quartz broadcast: Resuflor MPE, 15 mils.
 4. Grout Coat: Resuflor UVE, 15 mils.
 5. Topcoat: Resutile HTS 100, 3 mils.
 6. Color: As selected by Architect from manufacturer's full range.
 7. Location (s): Labs - See Drawings.
 8. Note: Include matching integral cove base.
 9. System Properties:
 - a. Tennant Quartz DB
 - 1) Abrasion Resistance, Taber Abraser CS-17 Taber Abrasion Wheel, 1,000 gram load, 1,000 revolutions, ASTM D4060, 18 mg/loss
 - 2) Adhesion to Concrete, psi [MPa], ASTM D4541, 450 [3.10] (concrete failed)
 - 3) Adhesion to Concrete, psi [MPa], ASTM D7234, 732 [4.48] (concrete failed)
 - 4) Coefficient of Friction-COF, James Friction Tester, ASTM D2047, 0.63
 - 5) Coefficient of Friction-Wet Static, BOT 3000, ANSI/NFSI B101.1, 0.94
 - 6) Compressive Strength, psi [MPa], ASTM D695, 13,500 [93.079]
 - 7) Flammabilitymm/min, ASTM D635, 182 mm/min
 - 8) König Hardness, ASTM D22540, 171.3
 - 9) Shore D hardness, ASTM D2240, 80-85 @ 0 sec | 75-80 @ 15 sec
 - 10) Sward Hardness (1mil flim), ASTM D2240, 30-40
 - 11) Tensile Strength, psi [MPa], ASTM D2370, 8,000 [55.158]
 - 12) Percent Elongation (resin only), ASTM D2370, 6%
 - 13) Volatile Organic Compound, VOC,lb/gal [g/l], ASTM D3960, Resuflor MPE A+B=0.41 [49] Resuflor UVE A+B=0.67 [81] Resutile HTS 100 A+B+C=0.05 [6]
 - 14) Water Absorption (24 hours), ASTM D570, 0.2% weight increase
 10. Product Properties:
 - a. Resuflor MPE: A neutral, two-component, high solids epoxy.

- 1) Percent Solids, by weight (by volume), ASTM D1475, A + B: 95.45 (94.56).
 - 2) Volatile Organic Compound-VOC, ASTM D3960, Mixed A + B: 0.41 lb./gal (49 g/L).
 - 3) Abrasion Resistance, mg loss, Taber Abraser, C-17 Taber Abrasion Wheel, 1,000 gram load, 1,000 revolutions, ASTM D4060: 83.1.
 - 4) Coefficient of Friction-COF, James Friction Tester, ASTM D2047: 0.59-0.62.
 - 5) Adhesion to Concrete, ASTM D5441: 732 psi (4.48 MPa) concrete failed.
 - 6) Adhesion to Concrete, ASTM D7234: 450 psi (3.10 MPa) concrete failed.
 - 7) Compressive Strength, ASTM D695: 13,500 psi (93.079 MPa).
 - 8) Tensile Strength, ASTM D2370: 8,000 psi (55.158 MPa).
 - 9) Percent Elongation, ASTM D2370: 5.
 - 10) Shore D Hardness, ASTM D2240: 80-85 @ 0 sec, 75-80 @ 15 sec.
- b. Resufloor UVE: A two-component, high solids, UV resistant epoxy.
- 1) Percent Solids, by weight (by volume), ASTM D2369, A + B: 92.60 (92.11).
 - 2) Volatile Organic Compound-VOC, ASTM D3960, A + B: 0.67 lb./gal (81 g/L).
 - 3) Abrasion Resistance, mg loss, Taber Abraser, C-17 Taber Abrasion Wheel, 1,000 gram load, 1,000 revolutions, ASTM D4060: 80-90.
 - 4) Coefficient of Friction-COF, James Friction Tester, ASTM D2047: 0.59-0.62.
 - 5) Compressive Strength, ASTM D69: 13,500 psi (93,150 MPa).
 - 6) Tensile Strength, ASTM D2370: 8,000 psi (55,158 MPa).
 - 7) Present Elongation, ASTM D2370: 5.
 - 8) Shore D Hardness, ASTM D2240: 80-85 @ 0 sec, 70-85 @ 15 sec.
- c. Resutile HTS 100: A clear high solids, three-component, satin finish, aliphatic, moisture-cure urethane.
- 1) Percent Solids, by weight (by volume), ASTM D2369, A + B + C: 94.02 (92.57).
 - (a) Volatile Organic Compound-VOC, ASTM D3960, Mixed A + B + C: 0.05 lb/gal (6 g/L).
 - 2) Abrasion Resistance, mg loss, Taber Abraser, C-17 Taber Abrasion Wheel, 1,000 gram load, 1,000 revolutions, ASTM D4060: 18.
 - 3) Coefficient of Friction-COF, James Friction Tester, ASTM D2047: 0.63.
 - 4) Wet Static Coefficient of Friction, BOT 3000, ANSI/NFSI B101.1: 0.94.
 - 5) Flammability, ASTM G154: 182 mm/min.
 - 6) Resistance to Yellowing as measured using ASTM D2244 after 1000 consecutive hours UV exposure in QUV, ASTM G154, <10 increase of yellow units (CIE Lab Δb)
 - 7) Tensile Strength, (resin only), ASTM D2370: 6,250 psi (43,092 MPa).
 - 8) Percent Elongation, (resin only), ASTM D2370: 6.
 - 9) König Hardness, (3 mil/76.2 micron film), ASTM D4366: 171.3.
 - 10) Water Absorption, 24-hour immersion, ASTM C413: 0.2 percent weight increase.
 - 11) Color: Selected by Architect.
- d. Decorative Quartz (Broadcast): Description, Color-coated, uniformly shaped and sized quartz granules
- 1) Grain Size: 40 mesh.
 - 2) Mohs Hardness: 6.5-7.
 - 3) Bulk Density, ASTM C29, packed: 90-105 pcf.
 - 4) Specific Gravity, ASTM C128: 2.65.
 - 5) Moisture Content, ASTM C566: Less than 0.05 percent.
 - 6) Colorfastness/UV Stability, ASTM G155: 1,000 hours, pass.
 - 7) Color: Selected by Architect.

B. Fluid-Applied Flooring (FAF-2):

1. Basis of Design: Tremco - TREMfloor Urethane Cement SR + FCUV.
2. Primer: Liquid primer recommended for substrate and conditions by traffic-coating manufacturer.

3. Base Coat: Aromatic Polyurethane.
4. Topcoat: Aliphatic Polyurethane [with UV inhibitors].
 - a. Color: [As selected by Architect from manufacturer's full range].
5. Topcoat Aggregate: Manufacturer's standard aggregate for each use indicated of particle sizes, shape, and minimum hardness recommended in writing by traffic-coating manufacturer.
6. Location(s) - Mechanical - See Drawings.
7. Note: Include matching integral cove base.

2.03 ACCESSORIES

- A. Base Caps: Zinc with projecting base of 1/8 inch (3 mm); color as selected.
- B. Subfloor Filler: Type recommended by fluid-applied flooring manufacturer.
- C. Primer: Type recommended by fluid-applied flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine concrete surfaces to receive flooring system. Verify concrete is structurally sound.
- B. Moisture Testing of Concrete: Perform at least one of the following two tests to determine moisture in concrete. Type of test and frequency as recommended by manufacturer and installer.
 1. In-situ Probe Test:
 - a. Measure relative humidity in concrete in accordance with ASTM F 2170.
 - b. Application of flooring system shall start only if test results are below 75 percent relative concrete humidity.
 - c. If test results are above limits, notify Architect and flooring manufacturer in writing.
- C. Do not begin preparation or installation until satisfactory moisture test results are achieved. Provide flooring manufacturer's recommended moisture vapor control coating if required.

3.02 SURFACE PREPARATION

- A. Prepare concrete surfaces in accordance with manufacturer's instructions and ASTM D 4258.
- B. Remove dirt, oil, grease, wax, laitance, curing compounds, water-soluble concrete hardeners, and other surface contaminants.
- C. Remove sealers, finishes, and paints.
- D. Remove unsound concrete by scarifying, sand blasting, shot blasting, or high pressure water blasting.
- E. Chemical Surface Preparation:
 1. Chemical surface preparation (acid etching) is unacceptable and will void Manufacturer's warranty.
- F. Mechanical Surface Preparation:
 1. Mechanically abrade concrete surface in accordance with manufacturer's instructions.
 2. Leave concrete surface with an aggressive texture.
 3. Remove concrete dust.
 4. Conform to ASTM D 4259.
 5. Surface profile shall conform to IRCI Guideline 03732, CSP 3-6
 6. All outside edges that do not terminate against a wall or curb must be "keyed" to avoid featheredges. All through-floor penetrations such as drains and trenches require a keyed edge that maintains a uniform 1/8" (3 mm) thickness.
- G. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
- H. Prepare concrete surfaces according to ICRI 310.2R.

- I. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- J. Vacuum clean substrate.
- K. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION

- A. Install flooring system in accordance with manufacturer's instructions and approved submittals at locations indicated on the Drawings.
- B. Ensure concrete is dry, clean, and prepared in accordance with manufacturer's instructions.
- C. Allow concrete to cure a minimum of 7 days before applying flooring system.
- D. Mixing:
 - 1. Mix material components together in accordance with manufacturer's instructions.
 - 2. Mix only enough material that can be applied within working time.
 - 3. Add and mix colorants with materials in accordance with manufacturer's instructions to achieve uniform color.
- E. Apply flooring system materials to obtain consistent mil thickness and smooth, uniform appearance and texture.
- F. Overlay: Apply overlay in accordance with manufacturer's instructions. Apply overlay to prepared concrete surface.
- G. Traction Aggregate: Broadcast traction aggregate in accordance with manufacturer's instructions. Broadcast traction aggregate into wet overlay.
- H. Cove:
 - 1. Apply cove primer and cove in accordance with manufacturer's instructions at locations indicated on the Drawings.
 - 2. Apply cove to height and shape as indicated on the Drawings.
 - 3. Apply cove to create seamless, smooth transition between flooring and walls.
- I. Seal Coat:
 - 1. Apply seal coat in accordance with manufacturer's instructions.
 - 2. Apply seal coat over traction aggregate.

3.04 CLEANUP

- A. Remove masking, draping, and other protection from adjacent surfaces.
- B. Remove remaining materials and debris from job site and dispose of them in accordance with local rules and regulations. Leave area in clean condition free of debris.

3.05 PROTECTION

- A. Allow flooring system to dry in accordance with manufacturer's instructions before opening to traffic.
- B. Allow flooring system to dry a minimum of 1 week before cleaning by mechanical means.
- C. Protect completed flooring system from damage during construction.

END OF SECTION

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**SECTION 09 6813
TILE CARPETING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.
- B. Removal of existing carpet tile.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied flooring.

1.03 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Maintenance Data: Include maintenance procedures and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Tile Carpeting: Tufted, manufactured in one color dye lot.
 - 1. Option 1:
 - a. CPT-1: Patcraft - Contour Fragment 10650, Raven 00590, with ecoworx backing.
 - 1) Size: 18 by 36 inches.
 - 2) Install: Ashlar.
 - 3) Location: Refer to drawings.
 - b. CPT-2: Patcraft - Running Stitch 10635, Custom color: F7420-1, with ecoworx backing.
 - 1) Size: 18 by 36 inches.
 - 2) Install: Ashlar.
 - 3) Location: Refer to drawings.
 - c. CPT-3: J + J Flooring - Z-Factor 1844, Propability 2863.
 - 1) Size: 18 by 36 inches.
 - 2) Install: Ashlar.
 - 3) Location: Refer to drawings.

- d. CPT-4: Mannington Commercial - Recoarse II, Black Bypass 1518.
 - 1) Size: 24 by 24 inches.
 - 2) Install: Ashlar.
 - 3) Location: Refer to drawings.
 - e. CPT-5: J+J Flooring - Tandus Centiva - Nova, Custom colors: 115159001-10-1, 11515900-10-2, & 115159001-10-3.
 - 1) Size: 24 by 24 inches.
 - 2) Install: Ashlar, equal random mix.
 - 3) Location: Refer to drawings.
 - f. CPT-6: Patcraft - Access 10533, Corridor 00510 with ecoworx backing.
 - 1) Size: 24 by 24 inches.
 - 2) Install: Brick.
 - 3) Location: Off vestibules.
2. Option 2:
- a. CPT-1: J + J Flooring - Elemental 7683, 2758 Draftsman.
 - 1) Size: 24 by 24 inches.
 - 2) Install: Ashlar.
 - 3) Location: Refer to drawings.
 - b. CPT-2: Mohawk Group - Biotope GT357, Custom color: 50311-S0202-0600.
 - 1) Size: 12 by 36 inches.
 - 2) Install: Ashlar.
 - 3) Location: Refer to drawings.
 - c. CPT-3: Existing match, no alternate option.
 - d. CPT-4: Existing match, no alternate option.
 - e. CPT-5: Existing match, no alternate option.
 - f. CPT-6: J+J Flooring - 02578 Abrasive Action, 1910 Charcoal.
 - 1) Size: 24 by 24 inches.
 - 2) Install: Brick.
 - 3) Location: Off Vestibules.

2.02 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Rubber, color as selected by Architect.
- C. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

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**SECTION 09 7200
WALL COVERINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation and prime painting.
- B. Vinyl Wall Covering.
- C. Tackable Wall Covering and Metal Trim Pieces.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall covering and adhesive.
- C. Shop Drawings: Indicate wall elevations with seaming layout.
- D. Samples: Submit one sample of wall covering, 6x6 inch (152.4x152.4 mm) in size illustrating color, finish, and texture.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 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 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.

1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 WALL COVERINGS

- A. General Requirements:
 - 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
 - 2. Vinyl Wall Covering (VWC-1):
 - a. Basis of Design: Smooth vinyl wallcovering substrate, as manufactured by Designtex, or equal.
 - 1) Approved Manufacturers:
 - (a) Designtex; www.designtex.com.
 - (b) Koroseal; www.koroseal.com.
 - (c) MDC; www.mdcwall.com.
 - (d) Substitutions: See Section 01 6000 - Product Requirements.
 - 2) Type: Type II.

- 3) Color: High Quality print, coordinate with owner for custom graphic.
 - 4) Finish: Additional UV2 Guardian coating, or equal.
 - 5) Location: Reference drawings.
 - 6) Note: Provide strike off and seaming diagram, to be approved by the Owner/Architect.
3. Tackable Wall Covering (TWC-1):
 - a. Basis of Design: Walltalkers, Tac-Wall, as manufactured by Koroseal, or equal.
 - b. Color: 06 Harbor.
 - c. Thickness: .25 inch.
 - d. Roll Width: 48 inches.
 - e. Location: Reception Desking.
 4. Tackable Wall Covering (TWC-2):
 - a. Basis of Design: Walltalkers, Tac-Wall, as manufactured by Koroseal, or equal.
 - b. Color: 09 Onyx.
 - c. Thickness: .25 inch.
 - d. Roll Width: 48 inches.
 - e. Location: Collaborative Design Space.
 5. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.

2.02 ACCESSORIES

- A. Metal Tac-Wall Trim (TR-3):
 1. Product: Fry Reglet, Millwork Reveal L-Angle MWRL100.
 2. Finish: Anodized, Buffed Brite Black.
 3. Location: Tackable surface trim at Collaborative Design Space, see drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work, and comply with requirements of wall covering manufacturer.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.
- C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet (3 mm in 3 m) nor vary at a rate greater than 1/16 inch/ft (1.5 mm/300 mm).

3.02 PREPARATION

- A. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.
- B. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- C. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.
- D. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.
- E. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.
- C. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.
- D. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.04 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

3.05 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION

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**SECTION 09 8430
SOUND-ABSORBING WALL AND CEILING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabric-covered sound-absorbing wall panels.
- B. Sound-absorbing ceiling panels.
- C. Sound-absorbing ceiling baffles.

1.02 RELATED REQUIREMENTS

- A. Section 09 5100 - Acoustical Ceilings: Ceiling suspension system.
- B. Section 09 5153 - Direct-Applied Acoustical Ceilings.
- C. Section 09 9123 - Interior Painting.

1.03 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2005 (Reapproved 2012).

1.04 SUBMITTALS

- A. Product Data: Manufacturer's printed data sheets for products specified.
- B. Shop Drawings: Fabrication and installation details, panel layout, and fabric orientation.
- C. Selection Samples: Manufacturer's color charts, indicating full range of fabrics or colors available.
- D. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch (305 by 305 mm), showing construction, edge details, and fabric covering.
- E. Test Reports: Certified test data from an independent test agency verifying that panels meet specified requirements for acoustical and fire performance.
- 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 Panels: Quantity equal to 5 percent of total installed, but not less than one of each type.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company with not less than five years of experience in manufacturing acoustical products similar to those specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation.
- B. Store units flat, in dry, well-ventilated space; do not stand on end.
- C. Protect edges from damage.

PART 2 PRODUCTS

2.01 FABRIC-COVERED SOUND-ABSORBING UNITS

- A. Acoustical Wall Panels (AWP-1): Fabric wrapped, glass fiber panels.
 - 1. Approved Products:
 - a. Sounds Concepts, AP.
 - b. Decoustics AP-General Purpose.

- c. Conwed Respond A.
- 2. Thickness: 2".
- 3. NRC: 0.90 to 1.0.
- 4. Panel size: Provide custom shapes/sizes as indicated on drawings.
- 5. Fabric Covering: Designtex - Gamut 3468, or equal.
 - a. Color: As selected by Architect from manufacturer's full range.
 - b. Width: 54 inches.
 - c. Patterns: Where fabric with directional weave is used, mark for installation in same direction.
 - d. Fabric: Must meet ASTM E84, Class A.

2.02 SOUND ABSORBING CEILING BAFFLES

- A. Acoustic Ceiling Baffle (BAF-1):
 - 1. Products:
 - a. Option 1: Turf - Beam, Acoustic Ceiling Baffle.
 - 1) Color: 06 Charcoal.
 - 2) Thickness: 3".
 - 3) Size: Length of baffle varies, refer to drawings.
 - b. Option 2: MDC - Zintra Baffles.
 - 1) Color: Slate.
 - 2) Thickness: 3".
 - 3) Size: Length of baffle varies, provide custom sizes as indicated on drawings.
 - 2. Mounting method: Suspended with Unistrut P1000 series, painted with custom color, supplied by installer via integrated flexible Feltlock connection, or equal mounting method.

2.03 SOUND ABSORBING CEILING PANELS

- A. Acoustical Ceiling Panels (ACP-1):
 - 1. Products:
 - a. Option 1: G&S Acoustics - Melody mTiles.
 - 1) Color: Silver.
 - 2) Thickness: 2".
 - 3) Size: Dimensions vary, provide custom sizes as indicated on drawings.
 - 4) Attachment Method: Direct applied with mechanical fasteners.
 - b. Option 2: Armstrong Ceilings - Tectum Direct Attach Ceilings.
 - 1) Color: To be selected by Architect from manufacturers full range.
 - 2) Thickness: 1".
 - 3) Size: Dimensions vary, provide custom sizes as indicated on drawings.
 - 4) Attachment Method: As recommended by manufacturer.

2.04 FABRICATION

- A. Fabric Wrapped, General: Fabricate panels to sizes and configurations as indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
- B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch (1.6 mm) for thickness, overall length and width, and squareness from corner to corner.

2.05 ACCESSORIES

- A. Ceiling-Suspended Accessories: Manufacturer's standard accessories at locations as indicated on each acoustical unit, sized appropriately for weight of acoustical unit.
 - 1. Contractor to provide and install Unistrut as required for baffle installation.
 - a. Suspend Unistrut at elevations indicated by the Architects drawings and submittals.
 - b. Install Unistrut at lengths indicated on drawings.
 - 2. Contractor to select and provide all anchors to building for mounting based on site requirements, conditions, and as appropriate for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.
- B. Install mounting accessories and supports in accordance with shop drawings.
- C. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.
- D. Suspend ceiling baffles at locations and heights as indicated.

3.03 CLEANING

- A. Clean sounds-absorbing panels upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

3.04 PROTECTION

- A. Provide protection of installed acoustical panels until Date of Substantial Completion.
- B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION

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**SECTION 09 9113
EXTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Exposed surfaces of steel lintels and ledge angles.
 - 2. Non-galvanized miscellaneous metal ladders, stairs and platforms.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Shop-primed items.
- B. Section 09 9123 - Interior Painting.

1.03 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.

1.05 QUALITY ASSURANCE

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

1.06 FIELD CONDITIONS

- A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Paints:
 - 1. Behr Process Corporation: www.behr.com/#sle.
 - 2. Diamond Vogel Paints: www.diamondvogel.com/#sle.
 - 3. PPG Paints: www.ppgpaints.com/#sle.
 - 4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- B. Primer Sealers: Same manufacturer as top coats.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
- B. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint ME-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
 - 1. One coat of latex primer.
 - 2. Semi-gloss: Two coats of latex enamel.
- B. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 - 2. Semi-gloss: Two coats of latex enamel.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Apply each coat to uniform appearance.
- C. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 PROTECTION

- A. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

**SECTION 09 9123
INTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Elevator pit ladders.
 - 3. Miscellaneous metals items including entries to building wings, primed steel railings, stair stringers, and pans.
 - 4. Prime surfaces to receive wall coverings.
 - 5. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
 - c. Paint interior surfaces of air ducts and convactor and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - d. Paint dampers exposed behind louvers, grilles, and convactor and baseboard cabinets to match face panels.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Shop-primed items.
- B. Section 05 5100 - Metal Stairs & Ships Ladder: Shop-primed items.

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 D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- D. SSPC-SP 1 - Solvent Cleaning; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 2. MPI product number (e.g. MPI #47).
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- G. 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 Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
 3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
- B. Paints and Coatings Manufacturers (unless noted otherwise herein)
 1. Diamond Vogel Paints: www.diamondvogel.com/#sle.
 2. PPG Paints: www.ppgpaints.com/#sle.
 3. Pratt & Lambert Paints: www.prattandlambert.com/#sle.
 4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: As follows unless other primer is required or recommended by manufacturer on top of coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Flammability: Comply with applicable code for surface burning characteristics.
- E. Colors: As indicated on drawings.
 - 1. Allow for minimum of six colors for each system, unless otherwise indicated, without additional cost to Owner.
 - 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
 - 1. One coat of latex primer sealer.
 - 2. Semi-gloss: Two coats of latex enamel.
- B. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
 - 1. One coat of block filler.
 - 2. Eggshell: Two coats of latex enamel.
- C. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
 - 1. One coat of latex primer.
 - 2. Eggshell: Two coats of latex enamel.
- D. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
 - 1. Touch-up with latex primer.
 - 2. Eggshell: Two coats of latex enamel.
- E. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
 - 1. One coat of alkyd primer sealer.
 - 2. Eggshell: Two coats of latex enamel; Walls.
 - 3. Flat: Two coats of latex enamel; Ceilings.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.05 SPECIALTY PAINTS

- A. Dryfall Paint (Dryfall) - Exposed Steel Ceiling Structure:
 - 1. Water born eggshell dryfall - Sherwin Williams B42W2, or equal.
 - 2. Roof structure and all materials suspended from structure shall be painted with eggshell paint by dry fallout method. Areas shall have uniform coverage. All residues shall be cleaned after completion.
 - 3. Verify items to be left unpainted with Architect.
- B. Wall Coating at Labs (typical, refer to Drawings)
 - 1. Basis of Design: Single-component, waterbased hybrid acrylic urethane, Sikagard 307W Wall Coating.
 - a. Mid-sheen finish.
 - 2. Epoxy Wall Paint (EP-Epoxy Paint):
 - a. CMU block filler where applicable.
 - b. One coat SW Series ProMar 200 Zero VOC B2W02600 Primer.
 - c. Two coats SW B73-300 Series Pro Industrial WB Epoxy Paint.
 - d. Eg-Shel finish.

2.06 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 - 4. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

- G. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- I. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- J. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- K. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

3.06 COLOR SCHEDULE

- A. P-1/EP-1: Sherwin Williams - Gossamer Veil SW9165; Sheen: Eggshell; Location: Typical throughout.
- B. P-2/EP-2: Sherwin Williams - Iron Ore SW7069; Sheen: TBD; Location: Black Accent, Portals as noted.
- C. P-3/EP-3: Sherwin Williams - Shamrock SW6454; Sheen: Eggshell; Location: Green Accent.
- D. P-4/EP-4: Sherwin Williams - Ceiling Bright White SW7007; Sheen: Flat; Location: Ceilings.
- E. P-5/EP-5: Sherwin Williams - Gray Clouds SW 7658; Sheen: TBD; Location: Light Gray Accent.
- F. P-6/EP-6: Sherwin Williams - Rayo Del Sol SW 9020; Sheen: Eggshell; Location: Yellow Accent.

END OF SECTION

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**SECTION 10 1100
VISUAL DISPLAY UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Markerboards

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Blocking and supports.
- B. Section 09 2116 - Gypsum Board Assemblies: Concealed supports in metal stud walls.

1.03 REFERENCE STANDARDS

- A. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on markerboard, tackboard surface covering, trim, and accessories.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Samples: Submit color charts for selection of color and texture of markerboard, tackboard, and tackboard surface covering.
- E. Maintenance Data: Include data on regular cleaning, stain removal.

1.05 QUALITY ASSURANCE

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

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Clarus: www.clarus.com.
- B. Claridge Products and Equipment, Inc: www.claridgeproducts.com.
- C. MooreCo, Inc: www.moorecoinc.com.
- D. Nelson Adams NACO: www.nelsonadamsnaco.com.
- E. Polyvision Corporation: www.polyvision.com. (Supplied by Aarco Products: www.aarcoproducts.com.)
- F. Substitutions: See Section 01 6000 - Product Requirements.

2.02 VISUAL DISPLAY UNITS

- A. Markerboards (MB-1): Magnetic Porcelain enamel on steel, laminated to core.
 - 1. Basis of Design Product:
 - 2. Color: White.
 - 3. Steel Face Sheet Thickness: 24 gage, 0.0239 inch (0.61 mm).
 - a. Markerboard surfaces must be magnetic.
 - 4. Core: Particleboard, 3/8 inch thick (9 mm thick), laminated to face sheet.
 - 5. Backing: Aluminum foil, laminated to core.
 - 6. Size: Custom sizing, as indicated on drawings.
 - 7. Frame: Extruded aluminum with concealed fasteners.
 - 8. Frame Finish: Anodized, natural.

9. Accessories: Provide box tray, expo marker/eraser set and 9 square magnets per board.
 10. Locations: Refer to drawings.
- B. Markerboards (MB-2): 1/4" tempered safety-rated glass.
1. Basis of Design Product: Clarus, Depth Magnetic Glass Markerboard.
 2. Color: White.
 3. Mounting: Stainless Steel Standoffs.
 - a. Finish: Jet Black.
 4. Size: Custom sizing, as indicated on drawings.
 5. Frame: No Frame.
 6. Accessories: Provide box tray, expo marker/eraser set and 9 square magnets per board.
 7. Locations: Work Cafe.
- C. Markerboards (MB-3): 1/4" tempered safety-rated glass.
1. Basis of Design Product: Clarus, Float Magnetic Glass Markerboard.
 2. Color: White.
 3. Mounting: Trumount Bracket.
 4. Size: Custom sizing as indicated on drawings.
 5. Frams: No Frame.
 6. Accessories: Provide box tray, expo marker/eraser set and 9 square magnets per board.
 7. Location: Refer to drawings.

2.03 ACCESSORIES

- A. Temporary Protective Cover: Sheet polyethylene, 8 mil (0.2 mm) thick.
- B. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.
- C. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Secure units level and plumb.
- C. All white boards/markerboards shall be mechanically fastened onto walls. **NDSU Guidelines mandate that gluing will not be allowed.**

3.02 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Cover with protective cover, taped to frame.
- C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

**SECTION 10 2113.19
PLASTIC TOILET COMPARTMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments.
- B. Urinal screens.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Concealed steel support members.
- B. Section 06 1000 - Rough Carpentry: Blocking and supports.
- C. Section 10 2800 - Toilet and Bath Accessories.

1.03 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- B. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall and ceiling supports, door swings.
- D. Samples: Submit two samples of partition panels, illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Approved Manufacturers:
 - 1. Metpar Corp: www.metpar.com/#sle.
 - 2. Scranton Products: www.scrantonproducts.com/#sle.
- B. Substitutions: Section 01 6000 - Product Requirements.

2.02 PLASTIC TOILET COMPARTMENTS

- A. Toilet Compartments (TP-1): Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE) CLASS A, tested in accordance with NFPA 286, floor-mounted headrail-braced. Privacy Options (Eclipse, by Scranton), Dorian Max (by Metpar).
 - 1. Option 1: Scranton - Eclipse, Solid Plastic HDPE Partitions. Color: Black, Orange Peel.
 - 2. Option 2: Metpar - Dorian Max, Solid Plastic HDPE. Color: Black 910.
- B. Doors:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Width: 24 inch (610 mm).
 - 3. Width for Handicapped Use: 36 inch (915 mm), out-swinging.
 - 4. Height: 72 inch (1829 mm), mounted 4 inch (102 mm) AFF and 72 inch (1829 mm), mounted 4 inch (102 mm) AFF for ADA stalls.
 - a. 12 inch toe clearance not required when ADA stall is 8 inches larger than minimum in both directions. Refer to Drawings for size of stall.

- b. Mounting for alternate product (Dorian Max, by Metpar) 6 inches AFF.
- C. Panels:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Height: 72 inch (1929 mm), mounted 4 inch (102 mm) AFF and 72 inch (1829 mm), mounted 4 inch (102 mm) AFF for ADA stalls.
 - a. 12 inch toe clearance not required when ADA stall is 8 inches larger than minimum in both directions. Refer to Drawings for size of stall.
 - b. Mounting for alternate product (Dorian Max, by Metpar) 6 inches above the floor.
- D. Pilasters:
 - 1. Thickness: 1 inch (25 mm).
 - 2. Width: As required to fit space; minimum 3 inch (76 mm).
- E. Urinal Screens: Match compartments; mounted to wall with two panel brackets and to the floor (one leg, attached similar to pilasters)..

2.03 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A 666, Type 304 stainless steel with No. 4 finish, 3 in (75 mm) high, concealing floor fastenings.
- B. Head Rails: Hollow anodized aluminum, 1 inch by 1 inch (25 mm by 25 mm) size, with anti-grip profile and cast socket wall brackets.
- C. Wall and Pilaster Brackets: Anodized aluminum; continuous type.
- D. Attachments, Screws, and Bolts: Stainless steel, Phillip head.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts, Phillip head.
- E. Hinges: Anodized aluminum, manufacturer's standard finish.
 - 1. Continuous-type (piano-style) hinge, self closing.
- F. Door Hardware: Anodized aluminum, manufacturer's standard finish.
 - 1. Door Latch: Thumbturn type with exterior emergency access feature.
 - 2. Door Strike and Continuous Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch.
 - 3. Provide door pull for outswinging doors.
- G. Coat Hook: One per compartment, mounted on door.
- H. Toilet Partition Suspension Members: As specified in Section 05 5000.
- I. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.
 - 1. Provide aluminum heat-sink strips at the exposed bottom edges of HDPE units to prevent burning.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. 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. Attach panel brackets securely to walls using anchor devices.
- C. Attach panels and pilasters to brackets.
- D. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch (6 mm).

B. Maximum Variation From Plumb: 1/8 inch (3 mm).

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).

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

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**SECTION 10 2600
WALL AND DOOR PROTECTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.
- B. Protective wall covering.
- C. Stainless Steel Wall Base.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Blocking for wall and corner guard anchors.
- B. Section 09 2116 - Gypsum Board Assemblies: Placement of supports in stud wall construction.

1.03 REFERENCE STANDARDS

- A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.
- B. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.
- C. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2014.
- D. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.
- C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
 - 1. Submit one sections of corner guards, 6 inches (152 mm) long.
 - 2. Submit two samples of protective wall covering and door surface protection, 6 by 6 inches (152 by 152 mm).
- D. 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 Stock Materials: One package(s) of minimum 96 inches (2438 mm) long unit of each kind of covers for corner guards.
- E. Maintenance Data: Manufacturer's instructions for care and cleaning of each type of product. Include information about both recommended and potentially detrimental cleaning materials and methods.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.
- B. Protect work from moisture damage.
- C. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.
- D. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Corner Guards:

1. Approved Manufacturers:
 - a. Babcock-Davis: www.babcockdavis.com.
 - b. Construction Specialties, Inc: www.c-sgroup.com.
 - c. Inpro: www.inprocorp.com.
 - d. Koroseal Interior Products: www.koroseal.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- B. Protective Wall Covering:
 1. Approved Manufacturers:
 - a. Construction Specialties, Inc: www.c-sgroup.com/#sle.
 - b. Inpro: www.inprocorp.com/#sle.
 - c. Pawling Corp: www.pawling.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Stainless Steel Wall Base:
 1. Approved Manufacturers:
 - a. Inpro: www.inprocorp.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE CRITERIA

- A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for compliance with applicable provisions of ASTM D256 and/or ASTM F476.
- B. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance complying with applicable provisions of ASTM D543.
- C. Fungal Resistance: Unless otherwise noted, provide protection products and assemblies which pass ASTM G21 testing.

2.03 PRODUCT TYPES

- A. Corner Guards - Surface Mounted:
 1. Corner Guard (CG-1) Basis of Design: Inpro - Aluminum Corner Guard, DW-AL01212-BLA.
 - a. Width of Wings: 3/4 inch (20 mm).
 - b. Height: One piece. Guard shall start above base and extend to match the height of adjacent door frames.
 - c. Finish: Black Anodized.
 - d. Location: Refer to drawings.
 2. Corner Guard (CG-2) Basis of Design: Inpro - Surface Mount Stainless Steel Corner Guard.
 - a. Width of Wings: 2 inches (21 mm).
 - b. Height: One piece. Guard shall start above base and extend to match the height of adjacent door frames.
 - c. Location: Refer to drawings.
- B. Protective Wall Covering: Include all necessary matching trim pieces and accessories.
 1. Option 1:
 - a. Protective Wall Covering (PWC-1): Inpro - Palladium Rigid Sheet.
 - 1) Color: Castle 0256.
 - 2) Material: Rigid Vinyl Sheet.
 - 3) Thickness: .040 inch (1 mm).
 - 4) Size: Custom size, 4' wide by 6'10" tall sheet.
 - 5) Location: Refer to drawings.
 - b. Protective Wall Covering (PWC-2): Inpro - Palladium Rigid Sheet.
 - 1) Color: Pebble Gray 0387.
 - 2) Material: Rigid Vinyl Sheet.
 - 3) Thickness: .040 inch (1 mm).

- 4) Size: Custom size, 4' wide by 8'2" tall sheet.
- 5) Location: Refer to drawings.
2. Option 2:
 - a. Protective Wall Covering (PWC-1): CS Construcation Specialties - Acrovyn Wall Coverings.
 - 1) Color: 262 Driftwood.
 - 2) Material: Rigid Sheet Vinyl.
 - 3) Thickness: .040 inch (1 mm).
 - 4) Size: Custom size, 4' wide by 6'10" tall sheet.
 - 5) Location: Refer to drawings.
 - b. Protective Wall Covering (PWC-2): CS Construcation Specialties - Acrovyn Wall Coverings.
 - 1) Color: 108 Black.
 - 2) Material: Rigid Sheet Vinyl.
 - 3) Thickness: .040 inch (1 mm).
 - 4) Size: Custom size, 4' wide by 8'2" tall sheet.
 - 5) Location: Refer to drawings.
3. Protective Wall Covering (PWC-3):
 - a. Material: Type 430 Stainless Steel, #4 Brushed Finish.
 - b. Thickness: 22 Guage.
 - c. Size: 4 by 8 feet.
 - d. Location: Welding.
 - e. Note: Mechanically fastened to wall.
4. Stainless Steel Wall Base (SSTB-1):
 - a. Basis of Design: Stainless Steel Wall base by Inpro Corp.
 - b. Material: Type 304 Stainless Steel, #4 finish, 18 guage.
 - c. Height: 6 inch.
 - d. Style: Cove.

2.04 FABRICATION

- A. Fabricate components with tight joints, corners and seams.
- B. Pre-drill holes for attachment.
- C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- B. Verify that field measurements are as indicated on drawings.
- C. Verify that substrate surfaces for adhered items are clean and smooth.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch (6 mm).
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch (6 mm).

3.04 CLEANING

- A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION

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**SECTION 10 2800
TOILET AND BATH ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
 - 1. Mirrors above lavatories.
 - 2. Grab bars in ADA stalls.
- B. Diaper changing stations.
- C. Utility room accessories.

1.02 OWNER FURNISHED ITEMS (INSTALLED BY CONTRACTOR)

- A. Toilet Paper Dispensers.
- B. Soap Dispensers.
- C. Paper Towel Dispensers.
- D. Sanitary Napkin/Tampon Dispensers: (1) one in each Women's Toilet Room.
- E. Sanitary Napkin Receptacle (1) at each stall at Women's Toilet Rooms.

1.03 RELATED REQUIREMENTS

- A. Section 08 8000 - Glazing: Other mirrors (not-standard sizes, not-framed).
- B. Section 10 2113.19 - Plastic Toilet Compartments.

1.04 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- E. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).
- G. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004 (Reapproved 2010).

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Commercial Toilet, Shower, and Bath Accessories:
 - 1. AJW Architectural Products: www.ajw.com.
 - 2. Impact Products, LLC: www.impact-products.com.

3. Hospital Specialties Co. (HOSPECO): www.hospeco.com.
 4. Rubbermaid Commercial Products: www.rubbermaidcommercial.com
 5. American Specialties, Inc: www.americanspecialties.com.
 6. Bradley Corporation: www.bradleycorp.com.
 7. Bobrick Washroom Equipment Inc.: www.bobrick.com.
 8. Substitutions: Section 01 6000 - Product Requirements.
- B. Diaper Changing Stations:
1. American Specialties, Inc: www.americanspecialties.com.
 2. Bradley Corporation: www.bradleycorp.com.
 3. Diaper Deck & Company: www.diaperdeck.com.
 4. Koala Kare Products: www.koalabear.com.
 5. Safe-Strap Company, Inc: www.diaperdepot.com.
 6. Substitutions: 01 6000 - Product Requirements.
- C. Provide products of each category type by single manufacturer.

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.
1. Grind welded joints smooth.
 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Stainless Steel Sheet: ASTM A666, Type 304.
- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- F. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.03 FINISHES

- A. Stainless Steel: No. 4, Satin finish, unless otherwise noted.
- B. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. Mirrors: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.
1. Size: As indicated in drawings.
 2. Frame: 0.05 inch (1.3 mm) angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
 3. Provide tempered safety glazing for mirrors as required by code and where indicated in the drawings.
- B. Grab Bars: Stainless steel, peened surface.
1. Heavy Duty Grab Bars: Floor supports are acceptable if necessary to achieve load rating.
 - a. Push/Pull Point Load: Minimum 1000 pound-force (4448.2 N), minimum.
 - b. Dimensions: 1-1/2 inch (38 mm) outside diameter, minimum 0.125 inch (3.17 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
 - c. Length and Configuration: As indicated on drawings.
 - d. Products:
 - 1) Model 812 by Bradley Corp or equal by an approved manufacturer.

2.05 DIAPER CHANGING STATIONS

- A. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.

1. Material: Polyethylene.
2. Mounting: Surface.
3. Color: To be selected from manufacturer's standard line.

2.06 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch (1.3 mm) thick stainless steel, Type 304, with 1/2 inch (12 mm) returned edges, 0.06 inch (1.6 mm) steel wall brackets.
 1. Drying rod: Stainless steel, 1/4 inch (6 mm) diameter.
 2. Hooks: Three, 0.06 inch (1.6 mm) stainless steel rag hooks at shelf front.
 3. Mop/broom holders: Four spring-loaded rubber cam holders at shelf front.
 4. Length: Manufacturer's standard length for number of holders/hooks.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.
- D. See Section 06 1000 - Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

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, unless otherwise indicated.
- D. Install grab bars to withstand a downward load of at least 250 lbs (1,000 lbs as specified) when tested according to method in ASTM F 446.

END OF SECTION

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**SECTION 10 4400
FIRE PROTECTION SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire blankets and cabinets.
- C. Fire extinguisher cabinets.
- D. AED (Automated external defibrillator) cabinets.
- E. Accessories.

1.02 RELATED REQUIREMENTS

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

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.
- B. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- C. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. ABC Fire Extinguisher Co: abcfire.com.
 - 2. Ansul, a Tyco Business: www.ansul.com.
 - 3. Kidde, a unit of United Technologies Corp: www.kidde.com.
 - 4. Nystrom, Inc: www.nystrom.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. Activar Construction Products Group - JL Industries: www.activarcpg.com.
 - 2. Ansul, a Tyco Business: www.ansul.com.
 - 3. Kidde, a unit of United Technologies Corp: www.kidde.com.
 - 4. Larsen's Manufacturing Co: www.larsensmfg.com.
 - 5. Nystrom, Inc: www.nystrom.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.

1. Class: A:B:C type. Minimum 3-A, 10 B:C.
2. Size: 5 pound (2.27 kg) in public areas and 10 pound (4.54 kg) in each fan, elevator machine, and mechanical equipment room.
3. Finish: Baked polyester powder coat, color as selected by Architect.
4. Temperature range: Minus 40 degrees F (Minus 40 degrees C) to 120 degrees F (49 degrees C).

2.03 FIRE EXTINGUISHER, BLANKET, & AED CABINETS

- A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
- B. Fire Rated Cabinet Construction: As indicated on drawings.
- C. Basis of Design:
 1. Fire Extinguisher Cabinet: Academy Series 1027V10, Aluminum Fire Extinguisher Cabinet, by JL Industries or equal by an approved manufacturer.
 2. AED (Automated External Defibrillator) Cabinet: JL Industries 1400 Series AED cabinet for Owner provided AED or equal by an approved manufacturer.
 3. Blanket Cabinet - JL Industries 650207, enamel paint finish, 2.75 lb processed Wool/synthetic fire blanket cabinet.
- D. Cabinet Configuration: Semi-recessed type.
 1. Size to accommodate accessories.
 2. Trim: Returned to wall surface, with 2-1/2 inch rolled edge projection, 1-3/4 inch wide face.
 3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- E. Door: 0.036 inch (0.9 mm) metal thickness, reinforced for flatness and rigidity with roller type catch. Hinge doors for 180 degree opening with continuous piano hinge.
 1. Provide theft resistant, replaceable plastic locks. Key all boxes alike.
- F. Door Glazing: Acrylic plastic, clear, 1/8 inch (3 mm) thick, flat shape and set in resilient channel glazing gasket. Must allow owner clear line of sight to extinguisher pressure gauge (typical).
- G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- H. Locks: Theft-resistant, replaceable plastic locks. Key all boxes alike.
- I. Weld, fill, and grind components smooth.
- J. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.
- K. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

- A. Fire Blanket: Fire retardant treated wool; red, 62 by 84 inch (1575 by 2135 mm) size.
- B. Extinguisher Brackets: Formed steel, galvanized and enamel finished. Provide brackets for extinguishers at mechanical and electrical rooms or at other non-public areas indicated on the drawings.
- C. Cabinet Signage: Silk-screened vertical red lettering applied to the door - FIRE EXTINGUISHER.

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 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

B. Secure rigidly in place.

END OF SECTION

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**SECTION 10 5613
METAL STORAGE SHELVING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Four post shelving (for 3D Printers).

1.02 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Rated uniform shelf loads.
 - 2. Details of shelving assemblies, including reinforcement.
 - 3. Accessories.
- B. Test Reports: Provide independent agency test reports documenting compliance with specified structural requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Four Post Shelving:
 - 1. Hallowell; High-Capacity Reinforced Bolted Shelving: www.hallowell-list.com/#sle.

2.02 SHELVING - GENERAL

- A. See drawings for layout and sizes.

2.03 FOUR POST SHELVING

- A. Four Post Shelving: Steel post-and-beam type with reinforced shelving ces, and accessories as specified.
 - 1. Unit Width: As indicated on drawings.
 - 2. Shelf Capacity: Uniform distributed load of 2,800 pounds per shelf, minimum.
 - 3. Adjustability of Shelving: At intervals of 1 inches on center, minimum.
 - 4. Shelf Levels per Unit: 5.
 - 5. Finish: Powder coat.
 - 6. Color: Manufacturer's standard gray.
 - 7. Number of Units: As indicated on drawings.
- B. Shelves: Formed sheet, finished on all surfaces .
 - 1. Metal Thickness: 14 gage cold rolled steel and double flanged at all four sides. Reinforce shelf units with 18 gage hat channel shape stiffeners welded to the underside of the shelf per manufacturer's requirements.
 - 2. Shelf Connection to Posts: Manufacturer's standard.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor and reinforce as specified, as indicated on drawings, and as recommended by manufacturer.
- C. Install shelving with shelf surfaces level and vertical supports plumb; adjust feet and bases as required.
- D. Out-Of-Square Tolerance - Four Post Shelving: Maximum of 1/8 inch difference in distance between bottom shelf and canopy top, measured along any post in any direction.

3.02 CLEANING

- A. Clean shelving and surrounding area after installation.

3.03 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

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**SECTION 10 5629
PALLET STORAGE RACKS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pallet storage racks.
- B. Pallet decking.
- C. Single Sided Cantilevered Storage Racks.

1.02 DEFINITIONS

- A. Industrial Pallet Rack: Single or multi-level structural storage system used to support high stacking of single items or palletized loads. Configured to allow rapid access to stored or mounted materials.
- B. Upright Frame: Columns, and bracing members between the columns.
- C. Pallet Beam: Front and back shelf members that bear the weight of the load and transfer it to upright frames.
- D. Pallet: A flat transport structure that supports goods in a stable fashion while being lifted by a forklift, pallet jack, front loader, work saver, or other jacking device, or a crane.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.04 SUBMITTALS

- A. Product Data: Materials and details of design and construction. Include system components, accessories, and substrate preparation recommendations.
- B. Shop Drawings: Indicate locations, type and layout of pallet racks, and erection sequence. Include lengths, heights, and aisle layout, and relationship (and connections, if any) to adjacent construction. Indicate configuration, and method of installation of decking units.
- C. Design Data: Provide design calculations, bearing seal and signature of structural engineer licensed to practice in the State in which the Project is located, showing load application and rack configuration(s).
 - 1. If a pallet rack or stacker rack system is permitted in more than one shelf configuration or profile, include in tabular form either (a) all the permissible configurations or (b) limitations as to the maximum number of shelves, the maximum distance between shelves and the maximum distance from the floor to the bottom shelf.
 - 2. If the racks are connected to the building structure, show the location and magnitude of maximum possible horizontal and vertical forces imposed on the building.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Designer's Qualification Statement.
- F. Project Record Documents: Record actual locations and initial configuration of racks in the project.
- G. 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 Stock Materials: Furnish system component items as follows:
 - a. Pallet Beams: 12.
 - b. Decking Units: 4.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with minimum five years of documented experience.

1.06 MOCK-UP

- A. Provide one lane/bay wide, full height mock-up for each type of pallet rack, incorporating major system framing members and connections.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all items to project site in packaging.
- B. Inspect for dents, scratches, or other damage.
 - 1. Repair damaged finishes.
 - 2. Replace damaged components.
- C. Store rack system components, accessories and installation anchors and fasteners in manufacturer's unopened packaging until ready for installation.
- D. Store rack system components, accessories and installation anchors and fasteners under cover and elevated above grade.

1.08 FIELD CONDITIONS

- A. Ambient Conditions: Maintain temperature within range recommended by the rack manufacturer during and after installation of pallet rack system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Penco Pallet Rack: www.pencoproducts.com
- B. Ridg-U-Rak: www.ridgurak.com
- C. Others as approved.

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, licensed in the State in which the Project is located to design storage systems.
- B. Structural Performance: Provide pallet systems capable of safely supporting loads as indicated below.
 - 1. Design in compliance with applicable requirements of 2018 IBC, including any amendments made by the State in which the Project is located.
- C. Seismic Performance: Pallet systems designed to withstand the effects of earthquake motions determined according to ASCE 7.
- D. Safety and Loading Performance: Comply with requirements of ANSI MH16.1.

2.03 SYSTEMS AND COMPONENTS

- A. General: Provide manufacturer's standard storage shelving systems and components.
- B. Where components are not explicitly indicated, provide manufacturer's standard components as required for a complete system.

2.04 PALLET RACK TYPES

- A. Single-Face Rack: One continuous row of units joined together and side-to-side, positioned along a wall, to be serviced by one service aisle, single-deep.
- B. Double-Face Rack: One continuous row of units joined together and side-to-side, to be serviced from either front or back by two service aisles, single-deep.
- C. Single Sided Cantilevered Rack: Load carrying arms projecting from a single column bolted at one end only; no aisle-side columns.

2.05 STEEL PALLET RACKS

- A. Pallet Racks: Rack system consisting of upright frames, and beams with integral locking devices for bolted connection to frame columns.

1. Roll-formed Columns: Bolted-beams application steel open-tube shape, 3 inches wide by 1-5/8 inches front-to-back, gauge as determined by structural design calculations.
 - a. Tapered keyholes on column sides, on 2 inch centers.
 2. Pallet Beams:
 - a. Steel Step Beams: Manufacturer's standard, unslotted-style, continuously-welded tubing, with fully-welded end-plates; size and gauge selected to safely carry design loads.
 - b. Beam Locking Devices: Manufacturer's standard pins, bolts or other mechanisms that resist disengagement of beam from its supports.
 3. Bases: Manufacturer's standard-duty seismic bases; fully-welded to columns in compliance with requirements of AWS D1.1/D1.1M; size and thickness as required by loads.
 4. Horizontal and Diagonal Bracing: Manufacturer's standard, sized and configured to provide required stability and minimize sway, selection of members determined by structural design calculations.
- B. Storage Positions:
1. Number of Aisles and Storage Lanes: As indicated on drawings.
 2. Sizes: As indicated on drawings.
 3. Maximum Loading: 1000 pounds per shelf.
 4. Decking: Welded-wire fabric; 6 gauge wire diameter, 2-1/2 inch by 4 inch wire spacing. Manufactured in compliance with ANSI MH26.2 requirements.
 - a. Design: Waterfall design, with U-channel.
- C. Cantilevered Racks:
1. Base Section: Match Column Section; anchor to concrete.
 2. Column: 8 inch nominal, Wide Flange Sections with punched holes in both flanges. Spacing determined based on product weight, size, and rigidity.
 3. Arm Length: 42 inches, unless noted otherwise. Vertically adjustable on 4 inch centers. Arm pitch 3/4 inch per foot.
 - a. Capacity per Arm: 2100 lbs minimum.
 4. Bolt and Anchor Holes: 13/16 inch diameter.
 5. Bracing: Pre-punched and factory welded for bolting to bracing clips on the columns.
 6. Hardware: All necessary hardware provided by manufacturer.

2.06 ACCESSORIES

- A. Column Protector Guards: Manufacturer's standard, independently-mounted.
- B. End-Aisle Protector Assembly: Manufacturer's standard.
- C. Row Spacers: Welded or bolted, manufacturer's standard.
- D. Fasteners and Anchors:
 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M.

2.07 MATERIALS

- A. Steel Sections and Plates: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M tubing.
- C. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
- D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.08 FINISHES - STEEL

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard two-coat finish consisting of prime coat applied as per SSPC-Paint 15 or SSPC-Paint 20 requirements, and a thermosetting topcoat to achieve a minimum dry film thickness of 2 mils, 0.002 inch.

- B. Color and Gloss: Penco Color No. 812 'Hunter Green'.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas, with installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of storage systems.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION - GENERAL

- A. Level and plumb racks to a tolerance of 1/2 inch in 120 inches.
- B. Use permanent shims or non-shrink grout as indicated by manufacturer.
- C. Set pallet rack system sufficiently away from walls to allow access behind shelving for maintenance, including treatment for pests and vermin.

3.03 RACK SYSTEM INSTALLATION

- A. Install rack system according to manufacturer's written instructions and as required to prevent movement and seismic distortion, to meet loading requirements, and to allow access for future adjustment of shelves.
- B. Provide anchors and fasteners required for securing rack system to structure.
- C. Install horizontal members at locations indicated on Drawings and as indicated in field by Architect, according to manufacturer's written instructions.

3.04 SPECIAL INSPECTIONS

- A. Provide special inspections as required by 2018 IBC, Chapter 17 and RMI recommendations.
 - 1. Verify seismic bracing and connections.
 - 2. Visually inspect field welds for compliance with AWS D1.1/D1.1M.
 - 3. Provide other testing as required for stability and safety of pallet racks. Comply with test method requirements of ANSI MH16.1.
- B. Submit reports to Architect for review and approval.
- C. Correct any deficiencies in pallet rack systems, including replacement of components not meeting requirements.

3.05 CLEANING AND PROTECTING

- A. Repair or remove and replace defective work as directed on substantial completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- C. Protect installed products from damage during remainder of the construction period.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Use operation and maintenance data as reference during demonstration.
 - 2. Briefly describe function, operation, and maintenance of each component.

END OF SECTION

**SECTION 11 2601
COLUMN PROTECTION GUARDS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Column Guard System.

1.02 SUBMITTALS

- A. Product Data: Indicate physical dimensions, features, and anchorage details.
- B. Samples: Submit two samples for verification purposes of color, texture, and alignment.
 - 1. Sample size: 12 inch length for each model specified including mounting hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Column Guards:
 - 1. Innoplast; Park Sentry Square: www.innoplast.com
 - 2. Sentry Protection Products; Park Sentry Square: www.sentrypro.com
 - 3. Others as approved.

2.02 COMPONENTS

- A. Column Guard System: Surface Mounted plank and corner pieces that fit together for a seamless installation. Size to fit square column dimensions. Provide interlocking keys and a set of column straps. Cut or add plank panels to fit columns.
- B. Material: Expanded Polypropylene, ARPRO material.
 - 1. Plank Thickness: 1.6 inches (40mm).
 - a. Plank Width: 17.25 inches with integrated cutting grooves at 1.6 inches (40mm) on center.
 - 2. Corner Thickness: 2.2 inches (55mm).
 - a. Wing Dimension: 3.35 inches from corner.
 - 3. Height: 39.3 inches.
 - 4. Color: Yellow
- C. Accessories:
 - 1. Adjustable Straps: 2 inches wide, black reflective nylon weave material with strap lock buckle. 2 each per column.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to columns.
- B. Measure and size the planks to fit the column. Cut or add planks to fit.
- C. Fit Corners and Planks together for seamless installation. Use manufacturer's key-locks.
- D. Strap column guard system with adjustable straps. Tuck excess strap length behind the strap for neat appearance.

END OF SECTION

**SECTION 11 5213
PROJECTION SCREENS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Front projection screen assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Supports for suspended projection screens.
- B. Section 06 1000 - Rough Carpentry: Wood blocking in walls and ceilings.
- C. Section 09 2116 - Gypsum Board Assemblies: Suspended gypsum board ceilings for recessed screens, and openings in gypsum board partitions for fixed and rear projection screens.
- D. Section 09 5100 - Acoustical Ceilings: Suspended panel ceilings for recessed screens.
- E. Section 26 0583 - Wiring Connections: Electrical supply, conduit, and wiring for electric motor operated projection screens.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Wiring diagrams for motor operators and actuators, and controls and switches.
- C. Shop Drawings: For custom installations, indicate dimensions, verified field measurements, mounting details, and interface with adjacent construction.
- D. Samples: For screen fabrics, submit two samples 6 by 6 inch (152 by 152 mm) in size.
- E. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.
- F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver projection screens to project site in manufacturer's original unopened packaging, and inspect for damage and proper size before accepting delivery.
- B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F (10 degrees C), and stack in accordance with manufacturer's recommendations.
- C. Acclimate screens to building temperatures for 24 hours prior to installation, in accordance with manufacturer's recommendations.

1.06 FIELD CONDITIONS

- A. Maintain interior of building between 60 degrees F (15 degrees C) and 75 degrees F (24 degrees C) during and after installation of projection screens.

1.07 WARRANTY

- A. Provide five year manufacturer warranty for projection screen assembly.

PART 2 PRODUCTS

2.01 FRONT PROJECTION SCREENS

- A. Manufacturers:
 - 1. Da-Lite Screen Company: www.da-lite.com.
 - 2. Draper, Inc: www.draperinc.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Front Projection Screens: Factory assembled unless otherwise indicated.
 - 1. In locations noted in drawings: Motorized, HD Progressive 1.1 screen, horizontally tensioned, ceiling recessed.
 - a. Screen Aspect Ratio: 16:9.
 - b. Diagonal: 119 inches.
 - c. Screen Dimensions: 58 inch high x 58 inch wide (1473.2 mm high x 1473.2 mm wide).
 - d. Basis of Design: Tensioned Advantage Electrol 21796LS manufactured by Da-Lite Screen Company.
- C. Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
 - 1. Material: Matte white vinyl on fiberglass backing, with nominal gain of 1.0 over viewing angle not less than 70 degrees from axis, horizontally and vertically.
 - 2. Seams: No seams permitted in fabric up to 96 inch (2438 mm) high by 72 inch (1829 mm) wide.
- D. Masking Borders: Black, on four sides.
- E. Extra Drop: Black; length TBD.
- F. Concealed-in-Ceiling Screen Cases: Steel, with integral roller brackets.
 - 1. Door Slat: Self trim; self-closing and -opening.
 - 2. Case Finish: Baked enamel.
 - 3. Case Color: White.
 - 4. End Caps: Steel; finished to match case.
 - 5. Electrically-Operated Screens: 1-1/2 inch (38 mm) aluminum door roller.
- G. Electrically-Operated Screens:
 - 1. Roller: 3 inch (76 mm) minimum (based on screen size), metal.
 - 2. Vertical Tensioning: Screen fabric weighted at bottom with steel bar and plastic end caps.
 - 3. Horizontal Tensioning: Tab-guided cable system.
- H. Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings.

2.02 ELECTRICAL COMPONENTS

- A. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.
- B. Motors: Direct drive, 110 V, 60 Hz.
 - 1. Screen Motor: Mounted inside roller; three wire with ground; quick reverse type and lifetime lubricated; equipped with thermal overload cut-off, internal junction box, electric brake, and pre-set accessible limit switches.
 - a. Electrical Characteristics: 1.2 amps.
 - b. Motor mounted on sound absorber.
- C. Controls: Three (3) position control switch with plate.
 - 1. Security: Provide key operated switch; provide 2 keys.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate is finished and ready to accept screen installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that openings for recessed screens are correctly sized.
- D. Verify type and location of electrical connections.
- E. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.02 PREPARATION

- A. Coordinate screen installation with installation of projection systems.
- B. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, fire suppression, and registers and grilles.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.
- B. Do not field cut screens.
- C. Install screens in mountings as specified and as indicated on drawings.
- D. Install plumb and level.
- E. Install electrically operated screens ready for connection to power and control systems by others.
- F. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.
- G. Test electrical screens for proper working condition. Adjust as needed.

3.04 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

**SECTION 11 5313
LABORATORY FUME HOODS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Standard bench-top laboratory fume hoods.
- B. Work surfaces.
- C. Service fittings and outlets.
- D. Airflow indicators and alarms.
- E. Piping and wiring within fume hoods for service fittings, light fixtures, switches, and other electrical devices.
- F. Filler panels and ceiling enclosures for fume hoods.

1.02 RELATED REQUIREMENTS

- A. Section 12 3553.13 - Metal Laboratory Casework: Additional requirements for base cabinets for fume hoods.
- B. Section 12 3553.19 - Wood Laboratory Casework: Additional requirements for base cabinets for fume hoods.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods.
- B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
- E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.
- F. ASTM D4101 - Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. SEFA 1 - Laboratory Fume Hoods.
- I. SEFA 2 - Installations.
- J. UL 1805 - Standard for Safety Laboratory Fume Hoods and Cabinets.

1.04 SUBMITTALS

- A. Product Data: Provide fume hood exterior and interior dimensions and construction, utility and service requirements and locations.
- B. Shop Drawings: Indicate locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required, locations and types of service fittings.
 - 1. Indicate duct connections, electrical connections, and locations of access panels.
 - 2. Include rough-in information for mechanical, plumbing, and electrical connections.
 - 3. Include layout of fume hoods in relation to laboratory casework, equipment, and other building construction.
- C. Samples: For fume hood exterior finishes, interior lining, and work top material, in manufacturer's standard sizes.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements. Provide documentation of successful Factory Acceptance Testing.
- E. Operation Data: Include description of equipment operation and required adjusting and testing.
- F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G. Project Record Documents: Record actual locations of concealed utility connections.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements: Where laboratory fume hoods are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's 'Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities' and ICC/ANSI A117.1.
- B. Product Standards: Comply with SEFA 1 *Laboratory Fume Hoods - Recommended Practices*. Provide fume hoods that are UL listed and labeled for compliance with UL 1805.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended locations and application.
- D. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- E. Installer Qualifications: Company specializing in performing work of the type specified and with minimum five years of documented experience.
- F. Preconstruction Testing: Factory-test each type of hood as per referenced standard.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or another suitable material.

1.07 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fume hoods unless building is enclosed, wet work and utility rough-in are complete, and HVAC system is operating and maintaining temperature and relative humidity at Occupancy Levels during remainder of Construction Period.
- B. Ambient Conditions: Maintain temperature and relative humidity at occupancy levels during and after installation of fume hoods.

1.08 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. Provide one year manufacturer warranty for manufacturer's standard items (listed by part number in manufacturer's official publication).

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Laboratory Fume Hoods:
 - 1. Basis of Design: Kewaunee Scientific Corp; V05 - General Purpose Bench Fume Hood with Vertical Rising Sash: www.kewaunee.com
 - 2. Mott Manufacturing Ltd; Safeguard with vertical rising sash: www.mott.ca
 - 3. Bedcolab: www.bedcolab.com
 - 4. ICI Scientific: www.iciscientific.com
 - 5. Other as approved.

2.02 PERFORMANCE REQUIREMENTS

- A. Fume hoods complying with the following when tested in accordance with ASHRAE Std 110:
 - 1. As-Manufactured (AM) Rating: AM 0.01 (0.01 ppm).
 - 2. As-Installed (AI) Rating: AI 0.10 (0.10 ppm).
 - 3. Average Face Velocity: 100 FPM (0.51 m/s) plus or minus 10 percent with sashes fully open.
 - 4. Face-Velocity Variation: Not more than 10 percent of average face velocity across the face opening with sash(es) fully open.
 - 5. Release Rate: 4.0 L/min.
 - 6. Static-Pressure Loss: Not more than 1/2-inch w.g. (124 Pa) at 100 FPM (0.51 m/s) face velocity with sash fully open when measured at four locations 90 degrees apart around the exhaust duct and at least three duct diameters downstream from duct collar.

2.03 FUME HOODS

- A. General Requirements:

1. Comply with SEFA 1.
 - a. Provide fume hoods UL listed and labeled for compliance with UL 1805.
2. Pre-pipe fume hoods for service fittings.
3. Pre-wire fume hoods for light fixtures and receptacles.
 - a. Terminate all wiring in a junction box on top of hood.
- B. Fume Hood: Bench mounted with combination sash.
 1. Ventilation: Variable Air Volume (VAV).
 2. Configuration: Standing-height; bench mounted.
 3. Nominal Interior Height: 48 inches.
 4. Sash Type: Vertical rising.
 - a. Leak-free enclosure box, manufacturer's standard construction, for vertical rising sash.
 - b. Glazing: Laminated safety glass.
 - c. Sash Guides: Corrosion-resistant polyvinyl chloride (PVC) track.
 - d. Vertical Sash mechanism: Designed to prevent sash drop in case of mechanism failure.
 - 1) Cable: Minimum 3/32 inch (2 mm) thick stainless steel of construction standard with the manufacturer.
 - e. Vertical Sash Pull: Type 316 stainless steel, with No.4 finish.
 5. Top Front Panel: Standard integral grille stamped into panel of same materials as fume hood exterior.
 6. Exterior: Sheet steel.
 - a. Color/Finish: To be selected by Architect from manufacturer's standard colors.
 7. Interior Lining: Epoxy resin. Square corners.
 8. Light Fixtures: UL labeled, vaporproof, LED light fixtures. Number and length of fixtures as necessary for fume hood width. Mounted above sealed safety glass panel. White baked-enamel finish on fixture interior.
 - a. Provide LED lamps with color temperature of 3500-4000 degrees K, and minimum color-rendering index of 85.
 9. Plumbing Services: Plumbing services shall consist of remote-control valves as selected, located within the end panels, controlled by extension rods projecting through the control panels of the hood, with color coded plastic handles. Interior fitting for gases and water shall be nylon panel flanges and angle serrated hose connectors, color coded. Interior 11610-FH-9 07/22 fittings for distilled water shall consist of a bronze tin lined, white color-coded, panel flange and angle serrated hose connector. Water goosenecks shall be cast bronze with a chemical resistant metallic bronze finish. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Inlet piping shall have a single-point connection for each valve provided and carried to a point 1 inch above the fume hood roof. Points of final service connection by other trades shall be at the stub provided by the fume hood manufacturer.
 10. Service Fittings and Fixtures:
 - a. Rate outlets and fixtures for Class 1 Div 1.
 - b. Domestic water connection.
 - c. Cup Sink and Faucet: Drop-in Epoxy, complete with removable stainer and waste fitting, side-mounted at floor-mounted fume hood.
 - 1) Shape: Round.
 - 2) Size: 5 inch (127mm) diameter.
 - 3) Connect to dirty waste line.
 11. Access Panels: Provide removable panels on both sides hood exterior and interior lining panels.
 12. Work Surface:

- a. Work Top for Fume Hoods Other Than Floor-mounted Type: Epoxy resin.
 - 1) Edge: Raised rim with rounded edges and corners.
- C. Fume Hood Base Cabinets:
 - 1. See Section 12 3553.13 - Metal Laboratory Casework.
 - 2. See Section 12 3553.19 - Wood Laboratory Casework.

2.04 FABRICATION

- A. General: Assemble fume hoods in factory to greatest extent possible. Disassemble fume hoods only as necessary for shipping and handling limitations, or as necessary to permit movement through a 35 inches by 79 inches clear door opening.
- B. Steel Exterior: Fabricated from steel sheet, 0.048 inch thick, with component parts screwed together to allow removal of end panels, front fascia, and airfoil and to allow access to plumbing lines and service fittings. Chemical-resistant finish applied to interior and exterior surfaces of component parts before assembly.
- C. Ends: Fabricated with double-wall end panels. Close area between double walls at front of fume hood and as needed to house sash counterbalance weights, utility lines, and remote-control valves.
- D. Lining Assembly: Unless otherwise indicated, assembled with stainless-steel fasteners or epoxy adhesive, concealed where possible. Joints sealed by filling with chemical-resistant sealant during assembly.
 - 1. Lining components fastened together with stainless-steel cleats or angles to form a rigid assembly to which exterior panels are attached.
 - 2. Punched fume hood lining side panels for service fittings and remote controls.
 - Removable plug buttons for holes not used for indicated fittings.
- E. Stainless-Steel Lining Assembly: Fully-welded unit consisting of end, back, and top panels, and work top with spill-containing raised edges; reinforced to form a rigid assembly.
- F. Rear Baffle: Same material as fume hood lining, unless otherwise indicated, at rear of hood with openings at top and bottom, with corrosion-resistant fasteners. Fabricated for removal to facilitate cleaning behind baffle.
- G. Exhaust Plenum: Full width of fume hood, sized and configured to provide uniform airflow, of same material as hood lining, and with duct stub for exhaust connection.
 - 1. Duct-Stub Material: stainless steel, unless otherwise indicated.
- H. Airfoil: At bottom of fume hood face opening, with 1 inch gap between bottom of airfoil and work top. Sash to close on top of airfoil. Designed to direct airflow across work.
 - 1. Fabricated from 14 gauge, 0.0781 inch stainless steel with No.4 finish.
- I. Filler Strips: As needed to close spaces between fume hoods and/or fume hood base cabinets and adjacent building construction. Fabricated from same material and with same finish as fume hoods or fume hood base cabinets, as applicable. Flange, notch, and reinforce filler strips. Fabricate to form well-fitting closures, free from oil-canning.
- J. Ceiling Extensions: Filler panels matching fume hood exterior to enclose space above fume hoods at front and sides of fume hoods, and extending from tops of fume hoods to approximately 4 inches (102 mm) above ceiling. Flange, notch, and reinforce ceiling extensions as required for rigidity. Fabricate to form well-fitting closures, free from oil-canning.
 - 1. Provide bottom-hinged access panels within the front ceiling extension filler panel to facilitate access to light fixture and other fume hood components at top of hood not readily accessible by other means.
- K. Finished Back Panels: Where rear surfaces of fume hoods are exposed to view, provide finished back panels matching rest of fume hood enclosure.
- L. Comply with requirements of other sections for factory installation of water and laboratory gas service fittings, piping, electrical devices, and wiring. Securely anchor fittings, piping, and conduit to fume hoods, unless otherwise indicated.

2.05 MATERIALS

- A. Steel Sheet: Cold-rolled, commercial steel (CS) sheet, complying with ASTM A1008/A1008M; matte finish; suitable for exposed applications.
- B. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- C. Glass-Fiber-Reinforced Polyester: Polyester laminate with a chemical-resistant gel coat on exposed faces, and having a flame-spread index of 25 or less according to ASTM E84.
- D. Epoxy: Factory molded, modified epoxy-resin formulation with smooth, nonspecular finish.
 - 1. Physical Properties:
 - a. Flexural Strength: Not less than 10,000 pounds per square inch.
 - b. Modulus of Elasticity: Not less than 2,000,000 pounds per square inch.
 - c. Hardness (Rockwell M): Not less than 100.
 - d. Water Absorption (24 Hours): Not more than 0.02 percent.
 - e. Heat Distortion Point: Not less than 260 degrees F.
 - f. Flame-Spread Index: 25 or less according to ASTM E84.
 - 2. Chemical Resistance: As follows when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:
 - a. No Effect:
 - 3. Color: Putty.
- E. Polypropylene: Unreinforced polypropylene complying with ASTM D4101, Group 01, Class 1, Grade 2.
- F. Laminated Safety Glass: ASTM C1172.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Fasteners: Stainless-steel, where exposed to fumes.

2.06 ACCESSORIES

- A. Airflow Monitors/Indicators and Alarms: Provide each fume hood with a airflow monitor/indicator complete with an audible and visual alarm that activates when airflow sensor reading is outside of preset range.
 - 1. Source: Fume hood manufacturer.
 - 2. Airflow Monitor/Indicator Functionality:
 - a. Type: A sensor module that monitors fume hood face velocity, and a display module that presents data as digital readout.
 - 1) Input power: 9 to 30 V AC/DC. Include power supply module or functionality.
 - 2) Display Range: 0 to 1,000 FPM.
 - 3) Alarm Condition Range: 50 to 250 FPM.
 - 4) Mounting: Flush.
 - 5) Readings: Remote sensor inserted in airflow stream.
 - 6) Accuracy: Maximum plus or minus 5 percent of set point.
 - 7) Visual Status Display: Green, yellow, and red LEDs.
 - 8) Airflow Display: Digital display of face velocity reading.
 - 9) Operating temperature: 55 to 86 degrees F .
 - 3. Airflow Alarm functionality: Audible (85 dB @ 4 inch distance), and visual alarm that activates when airflow sensor reading is outside of preset range.
 - a. Reset and test mode.
 - b. Programmable Switch: Designed to silence audible alarm and automatically reset when airflow returns to within preset range. Warning light to stay on when alarm is silenced.
 - c. Capability for integration with BAS (Building Automation System) via BACnet.
- B. Sash Alarms: Audible and visual alarm that activates when sash is opened beyond preset position.

1. Programmable silence and test switches.

2.07 SOURCE QUALITY CONTROL

- A. Factory testing of each type of fume hood.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Install fume hoods according to manufacturer's written instructions. Install level, plumb, and true; shim as required, using concealed shims, and securely anchor to building and adjacent laboratory casework. Securely attach access panels but provide for easy removal and secure reattachment. Where fume hoods abut other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Comply with indicated requirements for installing water and laboratory gas service fittings, and electrical and telecommunications devices.
 1. Install fittings in accordance with shop drawings, installation requirements in SEFA 2, and manufacturer's written instructions. Set bases and flanges of sink and work top-mounted fittings in sealant recommended by manufacturer of sink or work-top material. Securely anchor fittings to fume hoods.

3.02 FIELD QUALITY CONTROL

- A. Field test fume hoods as specified below.
 1. General: Test fume hoods as installed to assess airflow velocity. Perform tests with static mode (set sash position) conditions. Conduct testing as outlined below for 100% of the hoods provided in the Project.
 2. Preparation:
 - a. Inspect each fume hood to confirm its installation complies with drawings and specifications.
 - b. Inspect laboratory space to verify that construction complies with drawings and specified requirements.
 - c. Do not proceed with fume hood testing until an acceptable TAB report has been received.
 - d. Verify that proper temperature and pressurization of the lab space can be maintained, with door(s) to the space in closed and open positions.
 - e. Adjust non-complying physical and control systems until conditions favorable to testing fume hoods are present.
 3. Operating Conditions Tests:
 - a. Conduct face velocity tests to confirm that target velocities are being achieved within acceptable tolerances.
 - b. Conduct airflow indicator/monitor tests to confirm acceptable variation from corresponding measured value. Calibrate and adjust device to function within specified accuracy parameters.
 - c. Conduct exhaust flow and static pressure tests of the HVAC system and its controls to confirm flow volume and static pressures are within acceptable tolerances.
 - d. In projects with VAV lab ventilation systems, conduct response time and stability tests to confirm how the HVAC supply and exhaust systems respond to different sash opening positions.
 - e. Conduct tests of alarm device by shutting off the fume hood exhaust and verify that the individual fume hood alarm activates and operates in specified manner.
 - f. Conduct tests of individual controls provided at the fume hood (such as unoccupied cycle override, alarm override, etc.) to verify they operate in specified manner.
 4. Containment Performance Tests:
 - a. Conduct airflow visualization tests (local smoke challenges) to provide a visual indication of fume hood's capture performance.
 - 1) Coordinate disabling of local fire alarm system when performing this test.

- 2) Compensate for smoke discharge velocity and exposure outside of the fume hood.
 - 3) If required to be performed, do not proceed with the large volume challenge test if the hood has failed the local challenge test.
 - 4) Record a video of the test(s).
- b. Conduct tracer gas containment tests, using mannequins to confirm gas concentrations meet (are below) specified criteria.
- 1) Use tracer gas agreed-upon with Owner.

3.03 ADJUSTING

- A. Adjust moving parts for smooth, near silent, accurate sash operation with one hand only. Adjust sashes for uniform contact of rubber bumpers. Verify that counterbalances operate without interference.

3.04 CLEANING

- A. Clean finished surfaces, including both sides of glass; touch up as required; and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

3.05 DEMONSTRATION

- A. Demonstrate proper operation of fume hoods and their accessories to Owner's designated representative.

END OF SECTION

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**SECTION 12 2400
WINDOW SHADES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior manual roller shades.
- B. Interior motorized roller shades.
- C. Motor controls.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.
- B. Section 26 2726 - Wiring Devices: Finish requirements for wall controls specified in this section.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2015.
- C. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.
- D. WCMA A100.1 - Safety of Corded Window Covering Products; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
 - 1. Motorized Shades: Include power requirements and standard wiring diagrams for specified products.
- C. Selection Samples: Include fabric samples in full range of available colors and patterns.
- D. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum five years of documented experience with shading systems of similar size and type.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: MechoShade Systems LLC: www.mechoshade.com.
 - 1. Style: Ecoveil - 3% openness.
 - a. Notes: Labs windows - install full width + height of window (verify with Owner).
- B. Interior Manual and Motorized Roller Shades, Motors and Motor Controls:
 - 1. Draper, Inc: www.draperinc.com.
 - 2. Hunter Douglas Architectural; RB500 Motorized Roller Shades: www.hunterdouglasarchitectural.com.
 - 3. Levolor: www.levolor.com/commercial.
 - 4. Lutron Electronics Co., Inc; Sivoia QS Roller Shades: www.lutron.com.
 - 5. SWFcontract, a division of Springs Window Fashions, LLC: www.swfcontract.com.

6. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ROLLER SHADES

- A. General:
1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
 2. Provide shade system that operates smoothly when shades are raised or lowered.
 3. Motorized Shades: Motor system housed inside roller tube, controlling shade movement via motor controls indicated; listed or recognized to UL 325.
 - a. Comply with NFPA 70.
 - b. Electrical Components: Listed, classified, and labeled as suitable for the purpose intended. Where applicable, system components to be FCC compliant.
 - c. Motors: Size and configuration as recommended by manufacturer for the type, size, and arrangement of shades to be operated; integrated into shade operating components and concealed from view; fully compatible with controls to be installed.
- B. Roller Shades Type RS-1 - Basis of Design: MechoShade Systems LLC; Mecho/5 System; www.mechoshade.com.
1. Description: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories..
 - a. Drop Position: Regular roll.
 - b. Mounting: Window jamb mounted.
 - c. Size: As indicated on drawings.
 - d. Fabric: As indicated under Shade Fabric article.
 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 3. Roller Tubes:
 - a. Material: Extruded aluminum.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
 - d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
 4. Hembars: Designed to maintain bottom of shade straight and flat.
 5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
 - a. Provide a permanently lubricated brake assembly mounted on an oil-impregnated hub with wrapped spring clutch.
 - b. Brake to withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.
 - c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
 6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pound (43 kg) minimum breaking strength. Provide upper and lower limit stops.
 - a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
 7. Accessories:
 - a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners.
 - 1) Color: As selected by Architect from manufacturer's full range.
- C. Roller Shades Type RS-2 - Basis of Design: MechoShade Systems LLC; ElectroShade with WhisperShade IQ2 EDU, line voltage (120 VAC); www.mechoshade.com/#sle.
1. Description: Single roller, motor-operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
 - a. Drop Position: Regular roll.
 - b. Mounting: Window jamb mounted.

- c. Size: As indicated on drawings.
 - d. Fabric: As indicated under Shade Fabric article.
- 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
- 3. Roller Tubes:
 - a. Material: Extruded aluminum.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
- 4. Hembars: Designed to maintain bottom of shade straight and flat.
- 5. Accessories:
 - a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; color to be selected by Architect from manufacturers full range of colors.

2.03 SHADE FABRIC

- A. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
 - 1. Basis of Design:
 - a. MechoShade Systems LLC; EcoVeil Screens - 1550 Series (3% open): www.mechoshade.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Material: Thermoplastic olefin (TPO).
 - 3. Performance Requirements: Flammability: Pass NFPA 701 large and small tests.
 - 4. Openness Factor: 3%.
 - 5. Color: As selected by Architect from manufacturer's full range of colors.

2.04 MOTOR CONTROLS

- A. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the control intent indicated.
- B. Provide all components and connections necessary to interface with other systems as indicated.
- C. Manual Controls:
 - 1. Control Functions:
 - a. Open: Automatically open controlled shade(s) to fully open position when button is pressed.
 - b. Close: Automatically close controlled shade(s) to fully closed position when button is pressed.
 - c. Presets: For selection of predetermined shade positions.

2.05 ROLLER SHADE FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch (13 mm) space between bottom bar and window sill.
 - 2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.
- C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.

- B. Start of installation shall be considered acceptance of substrates.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.03 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.04 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 12 3553.13
METAL LABORATORY CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Double-sided Column Workstation
- B. Partition Module
- C. Adjustable Shelving
- D. Four Leg Adjustable Table
- E. Base Cabinets
- F. Solvent flammable storage safety cabinets.
- G. Ceiling service panels.
- H. Overhead service carrier.
- I. Free Standing Shelving Units
- J. Electrical Doghouse
- K. Countertops
- L. LED Task Lighting

1.02 RELATED REQUIREMENTS

- A. Section 11-5313 - Laboratory Fume Hoods.
- B. Section 12-3553.19 - Wood Laboratory Casework.

1.03 SUBMITTALS

- A. Product Data: Details of materials, component dimensions and configurations, construction details, joint details, attachments; manufacturer's catalog literature on hardware, accessories, and service fittings, if any.
- B. Shop Drawings: Casework locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required, and utility locations, if any.
- C. Samples For Color Selection: Color charts for each different finish material.
- D. Test Reports: Independent laboratory reports showing compliance with chemical and physical resistance requirements for casework finish.
- E. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- F. Finish touch-up kit for each type and color of materials provided.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
 - 1. Single Source: All Lab Casework products shall be provided by a single source, who will be responsible for the warranty period of all installed products. Lab Casework products will not be limited to a sole manufacturer.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.
- C. Design, material and construction of casework, shelving and tables shall comply with 'SEFA 8: Recommended Practices for Laboratory Grade Casework' performance and resistance standards.
- D. Electrical Components, Devices and Accessories: Listed and labeled per NFPA 70, Article 100.

1.05 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
 - 1. Ruptured, cracked, or stained finish coating.
 - 2. Discoloration, or lack of finish integrity.
 - 3. Cracking or peeling of finish.
 - 4. Weld or any other structural failure.
 - 5. Failure of hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Laboratory Casework:
 - 1. Bedcolab: www.bedcolab.com
 - 2. ICI Scientific: www.iciscientific.com
 - 3. Kewaunee Scientific Corp: www.kewaunee.com
 - 4. Mott Manufacturing LLC: www.mott.ca

2.02 METAL LABORATORY CASEWORK

- A. Partition Module.
 - 1. Module Uprights: Extruded aluminum with a double slotted steel insert for shelving at 1 inch increments.
 - 2. Module Frames: 16 gage CRS steel that lock into uprights to form a rigid connection.
 - 3. Removable access panels: 18 gage CRS steel, that are removable without the use of tools.
 - 4. Basis of Design: Kewaunee Scientific Corp; Kewaunee Six Inch Alpha Partition Module.
- B. Adjustable Shelving: Modular system supported by 11 gage brackets that mount into slots in the rear frame support structure. Adjustable in height on 1 inch increments.
 - 1. Wall Standards: 2 inch diameter tube to match the vertical members of the single-sided rear frame support structure with 1 inch steel stand-offs for mounting on wall. Slot pattern shall allow for 1 inch increments for height adjustment. Full height wall standards shall have leveling feet.
 - a. Full Height: 92 inches high, unless noted otherwise.
 - b. Half Height: 36 inches high, unless noted otherwise.
 - 2. Shelves: 16 gage steel, formed down 1 inch and returned back and up into a channel formation. Attach to shelf brackets without additional hardware or tools. Provide steel retaining lip on the front, where indicated. Provide stainless steel shelves where indicated; 16 gage, type 304.
 - a. Minimum Load Capacity: 200 lbs.
 - b. Shelf depth: 14 inches, unless noted otherwise.
 - c. Shelf lengths: 21, 24, 30, 36, 42, and 48 inches to match slots on rear frame support structure.
 - 3. Finish: Powder-coated steel.
 - a. Powder-coated steel: Custom color to match PNT2.
 - b. Stainless Steel: No. 4 brushed finish.
 - 4. Manufacturer Systems:
 - a. Bedcolab; Allegro.
 - b. ICI Scientific; Flexcore.
 - c. Kewaunee Scientific Corp; Alpha.
 - d. Mott Manufacturing LLC.
- C. Four Leg Adjustable Table: Worksurface support frame with two additional leg members bolted to the rear attachment collars. Adjustable in height from 30 to 36 inches AFF, including 1 inch work surface.
 - 1. Work Surface: Molded epoxy resin top, 1 inch thick, with drip grooves provided on the underside at all exposed edges.
 - 2. Color: As indicated on Drawings.
 - 3. Manufacturer Systems:
 - a. Bedcolab; Symphony.
 - b. ICI Scientific; Envision 3.0.
 - c. Kewaunee Scientific Corp; Enterprise.
 - d. Mott Manufacturing LLC.
 - 4. Accessories:

- a. 3-1/2 inch diameter molded polyurethane wheels and polyolefin core with self-lubricating bearing; rated to carry 250 lbs minimum. Leveling caster must swivel and have a locking brake.
 - b. Three stacked drawers hung from underside of movable tables.
 - c. Suspended open shelving.
 - 5. Power: Horizontal duplex power receptacle at both short ends of table. Provide 4 foot cord length, unless noted otherwise, at one end for connection to standard 5R/20 outlet (typical outlet). Include tray for cord storage.
- D. Base Cabinets:
 - 1. Primary Cabinet Material: Steel.
 - 2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions.
 - a. Base Cabinets: 22 inch.
 - 3. Structural Performance: In addition to the requirements of SEFA 3, SEFA 7 and SEFA 8M, provide components that safely support the following minimum loads, without deformation or damage:
 - a. Base Units: 500 pounds per linear foot across the cabinet ends.
 - b. Suspended Units: 300 pounds, minimum, static load.
 - c. Drawers: 125 pounds.
 - d. Hanging Upper Cases: 300 pounds.
 - e. Shelves: 100 pounds.
- E. Solvent Flammable Storage Cabinets: 18 gage double-wall metal construction with 1-1/2 inches of insulating air space; fully welded.
 - 1. Basis of Design: Justrite - 60 gallon, 2 shelves, 2 doors, self close, flammable cabinet, Sure-Grip EX, Yellow, Model #896020.
 - 2. Construct to NFPA 30 and applicable OSHA requirements.
 - 3. Fire Resistance: Maximum internal temperature of 325 degrees F when subjected to a ten-minute fire test and using a standard time-temperature curve in accordance with NFPA 30.
 - 4. Shelves: Full depth, adjustable with SpillSlope to direct spill so the back and bottom into a 2 inch leak-tested, EPA compliant sump. Welded shelf hangers.
 - 5. Bottom Pan: 2 inches deep, liquid-tight pan covering entire bottom of cabinet.
 - 6. Self-Leveling, Adjustable Feet: 4 each.
 - 7. Built-in Grounding Connector.
 - 8. Cabinet Hardware: UL-listed, self-closing, latching doors synchronized so that both doors will always fully close; three-point latching system in right-hand leaf of every pair of doors and equipped latching system with keyed lock; fusible-link hold-open device that releases the door to close when ambient temperatures exceeds 165 degrees F.
 - 9. Vents: Where noted, provide venting capable of achieving 5-10 cfm. Tie into building hazardous exhaust system. Provide manufacturer's dual vents with flame arrestors.
 - 10. Signage: Provide manufacturer's standard signage reading 'FLAMMABLE - KEEP FIRE AWAY' or similar message in bright red color.
- F. Acid and Base Storage Cabinets: 100 percent seamless thermoplastic coating inside the cabinet, with a powder-coated finish on exterior.
 - 1. Basis of Design: Justrite - ChemCor Lined Acid Cabinets - Free Standing, Model #8945222: www.justrite.com
 - 2. Double-wall, 18 gage steel with 3-point stainless steel bullet latching system.
 - 3. Leakproof 2 inch sump, dual vents with flame arrestors, adjustable leveling feet, and grounding connector.
 - 4. Capacity: 45 gallon/170 liter.
 - 5. Size: 65 inches high x 43 inches wide x 18 inches deep.

6. Doors: 2, self-close.
7. Shelves: 2.

2.03 ACCESSORIES

- A. Ceiling Service Panels: Designed to integrate into acoustical panel suspension grids for delivering multiple plumbing, electrical and data services.
 1. Fabricated to fit in standard 24 inches by 24 inches ceiling grids.
 2. Enclosure Material: 18 gage sheet steel with chemical-resistant finish specified herein.
 3. Required Fitting Types: Quick-connect fittings and hoses.
 4. Quick-Connect Fittings: Male and female types, suitable for service connected, 3/8 inch NPS.
 - a. Provide in up to eight different sizes (keys) to prevent connecting to wrong service.
- B. Overhead Service Carrier: Integrate snorkel arms with carrier, and service valves (quick connect couplings) for service outlets.
 1. Strut-Based Carrier (Exposed): Busway attached to the outside with lab services protruding from the bottom. Electric and data raceways mounted to the outside of the formed channel.
- C. Slotted Channel Framing: By General Contractor; see Drawings.
- D. Electrical Doghouses: Lab bench pedestal table box (2-gang) with clear anodized aluminum housing. See Electrical for configuration: one 15A, 20A simplex or duplex GFCI. Provide data keystone jacks as indicated.
 1. Basis of Design: Legrand North America, LLC; Legrand Table Box

2.04 COUNTERTOPS

- A. Countertops:
 1. Phenolic Resin: Duromer high pressure laminate with a double-cured polyurethane acrylic coating; double sided decor to through color core.
 - a. Thickness: 25 mm (1 inch).
 - b. Color: '0075 Dark Grey' with black core, Fundermax Max Resistance2.
 2. Epoxy Resin Countertops: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components.
 - a. Flat Surface Thickness: 1 inch, nominal.
 - b. Surface Finish: Smooth, non-glare.
 - c. Color: Black.
 - d. Exposed Edge Shape: 3/16 inch radius corner.
 - e. Drip Edge: Drip groove 1/8 inch wide and deep, located 1/2 inch back from edge on underside of each exposed edge.
 - f. Back and End Splashes: Same material, same thickness; separate for field attachment.
 - g. Fabricate in accordance with manufacturer's standard requirements.
 - h. Support Frame: 7/8 inch tall, constructed of steel channels. Install at open space over 36 inches in width.
 3. Electrostatic Dissipative (ESD) Laminate: Nevamar ESD or equal.
 - a. Low electrical resistance. Surface to ground less than 1×10^9 ohms.
 - b. Absolute charge drainage and zero voltage suppression. Dissipates a 5000 volt static charge to zero in less than 0.01 seconds per FTM-101C at 5 to 95 percent relative humidity.
 - c. Provide manufacturer's flush to surface ground.
 - 1) Flat socket cap screw 8-32-1 to secure the brass insert in place.
 - 2) Brass insert, 1/2 inch diameter straight knurl providing electrical connection to the laminate.

- 3) Washer, Flat 1/4 inch I.D., 1/2 inch O.D. providing a flat surface for securing ring terminals.
- 4) Terminal, Ring, mechanically connects up to 16 gauge wire to the flush mount insert.
- 5) Nut, 8-32 used to fasten flush mount insert system together.
- 6) Dual banana jack terminals, 10 feet of 22 gauge wire, providing two banana plug connections in front of work surface grounded to the flush mount insert system.
- d. Thickness: 0.028 inches (0.7mm). Apply to 3/4 inch MDF substrate meeting or exceeding ANSI A208.2 Grade 130.
- e. Color: ST6055 Graystone.
4. Sinks: Molded epoxy resin drop-in type with tailpiece, undermount, and cup sink. Size as indicated on drawings and Lab Sink Schedule.
 - a. Color: Black, non-glare.
 - b. Drain: Offset as shown on drawings.
5. Water Faucets:
 - a. P-1 Laboratory Mixing Faucet, deck mounted, 8 inch rigid gooseneck, L110 vacuum breaker, wrist blade handles, and mounting shanks. 13 inch overall height.
 - 1) Basis of Design: WaterSaver Faucet; L1514-8-110BH-WSA
 - b. P-2 Laboratory Mixing Faucet, deck mounted, 10 inch rigid gooseneck, L110 vacuum breaker, wrist blade handles, and mounting shanks. 16 inch overall height.
 - 1) Basis of Design: WaterSaver Faucet; L1514-10-110BH-WSA
6. Service Turrets:
 - a. 90-Degree Double, Deck Mounted: WaterSaver BI064-2A (Two 1/4 inch NPT female inlets, Two 3/8 inch NPT female outlets).
 - b. 180-Degree Double, Deck Mounted: WaterSaver BI064-2S (Two 1/4 inch NPT female inlets, Two 3/8 inch NPT female outlets).
 - c. Deck Mounted Single: WaterSaver BI131 (3/8 inch NPT female inlet, 3/8 inch NPT female outlet).
 - 1) Deck Mounted Double, 90-Degree: WaterSaver BI132A
 - 2) Deck Mounted Double, 180-Degree: WaterSaver BI132S
 - 3) Deck Mounted, Four Outlets: WaterSaver BI134
7. Concealed Brackets:
 - a. Load Rating: 300 lbs per bracket.
 - b. Products:
 - 1) A&M Hardware, Inc; Hybrid Concealed Brackets, 24 inch:
www.aandmhardware.com
 - 2) Rakks, EH-Inside Wall Mount, Flush Mounted Brackets, EH-1824FM:
www.rakks.com
 - c. Finish: Powder coat, color as selected by Architect.

2.05 TASK LIGHTING

- A. LED Task Lighting: Thin-profile, white, LED strip with a touch dimmer switch, UL listed with 120 VAC to 24 VDC power supply and 10 foot power cord. Provide magnetic mounting strip for steel casework and integral tabs for mounting to wood and plastic laminate.
 1. Basis of Design: Hera Lighting; AKOD-LED: www.heralighting.com
 2. Length: 20 inch and 40 inch nominal. Refer to Elevations for locations. Indicate fixture length and number of fixtures on casework shop drawings.

2.06 MATERIALS

- A. Sheet Steel: High-strength low-alloy, cold rolled and leveled unfinished steel sheet, ASTM A1008/A1008M, Class 1 (matte) finish.
- B. Stainless Steel Sheet: ASTM A666, Type 304.
- C. Solid Epoxy Resin: Modified epoxy resin and non-asbestos inert fillers cast into sheets.

- D. Glass: Fully tempered float; ASTM C1036, Type 1, Quality Q3; ASTM C1048, tempered using horizontal tempering and complying with ANSI Z97.1; 4 mm thick minimum; exposed edges ground, and cut or drilled to receive hardware; clear.
- E. Plastic Sheet: Acrylic, clear, 1/4 inch thick.
 - 1. Transparent.
- F. Cabinet Hardware: Manufacturer's standard styles, exposed components stainless steel.
 - 1. Finish of Exposed Components: No. 4 finish.
 - 2. Shelves:
 - a. Shelf Standards and Rests: Vertical stainless steel standards with rubber button fitted steel rests.
 - b. Shelf Brackets: Vertical stainless steel standards with stainless steel arms.
 - 3. Swinging Doors:
 - a. Hinges: Offset pin.
 - b. Catches: Magnetic or nylon roller.
 - c. Pulls: Stainless steel wire pulls, 4 inches wide.
 - 4. Drawers:
 - a. Pulls: Stainless steel wire pulls, 4 inches wide.
 - b. Slides: Steel, full extension arms, ball bearings; capacity as recommended by manufacturer for drawer height and width.
- G. Electrical Outlet Covers: Stainless steel with grey electrical socket coordinate with Electrical Section 26-2726 Wiring Devices.
- H. Sealant For Use in Casework Construction: Manufacturer's recommended type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions and with SEFA 2.
- B. Perform installation in accordance with manufacturer's instructions and with SEFA 2.3.
- C. Use anchoring devices to suit conditions and substrate materials encountered.
- D. Set casework items plumb and square, securely anchored to building structure.
- E. Align cabinets to adjoining components, install filler panels where necessary to close gaps.
- F. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
 - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
 - 2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
 - 3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
 - 4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- G. Separate dissimilar metals to prevent galvanic action.
- H. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- I. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- J. Replace units that are damaged, including those that have damaged finishes.

END OF SECTION

SECTION 12 3553.19
WOOD LABORATORY CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood cabinets and cabinet hardware.
- B. Mobile cabinets.
- C. Free standing open adjustable wood shelving.
- D. Wood storage cubbies.
- E. Acid and Bases storage cabinets.
- F. Countertops.
- G. Pegboard Drying Racks.

1.02 RELATED REQUIREMENTS

- A. Section 09-6500 - Resilient Flooring: Resilient base applied to casework base.
- B. Section 11-5313 - Laboratory Fume Hoods.
- C. Section 12-3533.13 - Metal Laboratory Casework.
- D. Mechanical: Plumbing faucets and fittings.
- E. Electrical: Electrical services, fittings, and final connections.

1.03 DEFINITIONS

- A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.
- B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.
- C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.
- D. Full Flush Overlay: 1/8 inch reveal between all individual door and drawer components within a cabinet. Provide a 1/16 inch reveal at the edge of door and drawer components to the edge of the cabinet to maintain an 1/8 inch reveal on adjacent cabinets.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Large Components: Ensure that large components can be moved into final position without damage to other construction.
- B. Service Fixtures: Coordinate location and characteristics of service connections.

1.05 SUBMITTALS

- A. Product Data: Component dimensions, configurations, construction details, joint details, attachments; manufacturer's catalog literature on hardware, accessories, and service fittings, if any.
- B. Shop Drawings: Casework locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required, and utility locations, if any.
 - 1. Include all types of wood casework and millwork (cubbies).
- C. Samples For Color Selection: Wood samples for both lab casework and storage cubbies, fully finished, for color and species selection. Architect to review finished wood samples for matching of wood species, stain color and finish. Approved samples will be the bases for project requirements. Unacceptable Samples will be rejected and manufacturer to submit additional Samples until accepted by the Architect. Owner will not bare costs for re-issuing of samples to obtain correct finish.
- D. Test Reports: From independent laboratory indicating compliance with referenced chemical-resistance standards for cabinet finish and liner materials, and cabinet construction.
- E. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- F. Finish touch-up kit for each type and color of materials provided.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
 - 1. Single Source: All Lab Casework products shall be provided by a single source, who will be responsible for the warranty period of installed products.
- B. Design, material and construction of casework, shelving and tables shall comply with 'SEFA 8: Recommended Practices for Laboratory Grade Casework' performance and resistance standards and 'SEFA 8W: Laboratory Grade Wood Casework'.
- C. Electrical Components, Devices and Accessories: Listed and labeled per NFPA 70, Article 100.
- D. Formaldehyde content: Provide wood products documented to have low formaldehyde emissions that meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins.
 - 1. FSC Certification

1.07 DELIVERY, STORAGE AND HANDLING

- A. Products shall have packaging that protects finished surfaces from soiling or damage during shipping, delivery and installation.
- B. Casework shall be delivered to site after painting, utility rough-in and related activities are complete. Do not mar finish of casework with work of other trades.
- C. Store casework in the area that it will be installed. Maintain environmental conditions required by casework manufacturer. HVAC system shall be operable and functioning to maintain temperature and the relative humidity shall be stable and regulated between 25 and 55 percent.

1.08 WARRANTY

- A. Provide manufacturer's warranty for materials and workmanship. Casework shall remain free from defects for a period of 3 years from Date of Substantial Completion. Defects include, but are not limited to the following:
 - 1. Ruptured, cracked or peeling veneer.
 - 2. Discoloration or lack of finish integrity.
 - 3. De-lamination of components or edge banding.
 - 4. Slippage, shift, or failure of attachment to wall, floor or ceiling.
 - 5. Warping or unloaded deflection of components.
 - 6. Hardware failure.

PART 2 PRODUCTS

2.01 MANUFACTURERS - WOOD LABORATORY CASEWORK:

- A. Basis of Design: Kewaunee Scientific Corp; Signature Series - Contemporary Full Overlay - Style 5: www.kewaunee.com
- B. Mott Manufacturing LLC; Full Flush Overlay, OL1: www.mott.ca
- C. CiF Lab Solutions LP; E-Line Series: www.cifsolutions.com
- D. Diversified Woodcrafts: www.diversifiedwoodcrafts.com
- E. ICI Scientific / CampbellRhea Casework; Maple Series - Tier One: www.iciscientific.com

2.02 WOOD LABORATORY CASEWORK

- A. Wood Laboratory Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels.
 - 1. Style: Full Flush Overlay.
 - 2. Construction: Provide joints doweled, glued and screwed, except drawers may be lock shoulder jointed; with interior of units smooth and flush; cabinet bottom flush with top of face frame; without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
 - 3. Structural Performance: In addition to the requirements of SEFA 3, 7 and 8W, components shall safely support the following minimum loads in addition to the weight of the work surfaces:

- a. Base Units: 500 lbs/linear ft across the cabinet ends.
 - b. Suspended Units: 300 lbs static load.
 - c. Tables: 300 lbs, minimum, on four legs.
 - d. Drawers: 125 lbs, minimum.
 - e. Hanging Wall Cases: 300 lbs (136 kg).
 - f. Shelves: 100 lbs, minimum.
4. Glazing: With gasket and removable stops; minimize rattling and vibration.
 5. Fixture Locations: Cut and drill counter tops, backs, and other components for service outlets and fixtures.
 6. Access Panels: Provide access panels for maintenance of utility service and mechanical and electrical components.
 7. Perforated Grille Panels: Stainless steel, 18 gage.
 - a. Pattern: Staggered, 1/8 inch round holes at 3/16 inch on center.
 - b. Open Area: 40 percent minimum.
 8. Finish: Factory-finish all exposed and semi-exposed surfaces with the same finish.
 - a. Finish Performance: Provide finish on all surfaces having chemical resistance of Level 0 (no change) or Level 1 (slight change of gloss or slight discoloration) according to SEFA 8W and no visible effect when surface is exposed to:
 - 1) Hot water at temperature between 190 degrees F and 205 degrees F trickled down the test surface at 45 degree angle for 5 minutes.
 - 2) Constant moisture in the form of 2 by 3 by 1 inch thick cellulose sponge kept continually saturated with water and in contact with test surface for 100 hours.
 - b. Preparation: Wood sanded smooth, free from dust and mill marks.
 - c. Coating: Clear, superior-quality, chemical-resistant acyclic urethane; applied in accordance with manufacturer instructions, force-dried, sanded and wiped clean.
 - d. Coats: Multiple coats as required to achieve minimum 1.5 mil dry film thickness.
 - e. Appearance: Clear satin gloss; not cloudy or muddy.
 9. Continuous toe kick at island base cabinets.
 10. Toe kick integral with base cabinet doors at accessible sinks.
- B. Free standing shelving with open adjustable shelves: Provide with island support module (ends) to support shelves. See drawings for sizes.
- C. Mobile Cabinets: Same construction as fixed base cabinets, with modifications.
1. Toe kick space eliminated.
 2. Cabinet underside reinforced as is standard with the manufacturer to provide caster mounting points.
 3. Four casters, each with a load rating of 165 pounds.
 4. For cabinets with drawers, include a counterweight to prevent the cabinet from tipping when one drawer is opened.
 - a. Rate drawers at 50 pounds maximum.
- D. Acid and Bases Storage Cabinets: Construction identical to other cabinets, with following exceptions:
1. Completely lined with corrosion-resistant liner material; stainless steel fasteners for all connections and hardware inside cabinets.
 2. Shelves: Removable, same material as cabinet, covered with corrosion-resistant liner.
 3. Bottom Pan: Liquid-tight liner covering entire bottom of acid-storage cabinet.
 4. Vents: Comply with SEFA 1.2.
 - a. Locate acid-storage cabinet vents in accordance with manufacturer's instructions.
 - b. Vent base cabinets with manufacturer's vent kit.
 - c. Vent each acid-storage cabinet separately.
 - d. Seal penetrations with chemical-resistant sealant.
 - e. Signage as shown on drawings.

2.03 COUNTERTOPS

A. Countertops:

1. Phenolic Resin: Duromer high pressure laminate with a double-cured polyurethane acrylic coating; double sided decor to through color core.
 - a. Thickness: 25 mm (1 inch).
 - b. Color: '0075 Dark Grey' with black core, Fundermax Max Resistance2.
2. Epoxy Resin Countertops: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components.
 - a. Flat Surface Thickness: 1 inch, nominal.
 - b. Surface Finish: Smooth, non-glare.
 - c. Color: Black.
 - d. Exposed Edge Shape: 3/16 inch radius corner.
 - e. Drip Edge: Drip groove 1/8 inch wide and deep, located 1/2 inch back from edge on underside of each exposed edge.
 - f. Back and End Splashes: Same material, same thickness; separate for field attachment.
 - g. Fabricate in accordance with manufacturer's standard requirements.
3. Electrostatic Dissipative (ESD) Laminate: Nevamar ESD or equal.
 - a. Low electrical resistance. Surface to ground less than 1×10^9 ohms.
 - b. Absolute charge drainage and zero voltage suppression. Dissipates a 5000 volt static charge to zero in less than 0.01 seconds per FTM-101C at 5 to 95 percent relative humidity
 - c. Provide manufacturer's flush to surface ground.
 - 1) Flat socket cap screw 8-32-1 to secure the brass insert in place.
 - 2) Brass insert, 1/2 diameter straight knurl providing electrical connection to the laminate.
 - 3) Washer, Flat 1/4 inch I.D., 1/2 inch O.D. providing a flat surface for securing ring terminals.
 - 4) Terminal, Ring, mechanically connects up to 16 gauge wire to the flush mount insert.
 - 5) Nut, 8-32 used to fasten flush mount insert system together.
 - 6) Dual banana jack terminals, 10 feet of 22 gauge wire, providing two banana plug connections in front of work surface grounded to the flush mount insert system.
 - d. Thickness: 0.028 inches (0.7mm). Apply to 3/4 inch MDF substrate meeting or exceeding ANSI A208.2 Grade 130.
 - e. Color: ST6055 Graystone.
4. Sinks: Molded epoxy resin drop-in type. Size as indicated on drawings and Lab Sink Schedule.
 - a. Color: Black, non-glare.
5. Undermount Stainless Steel Sinks. Type 304. Size as indicated on drawings and Lab Sink Schedule. Provide No. 4 brushed finish.

2.04 MATERIALS

- A. Wood-Based Materials:
- B. All hardwood shall be thoroughly air-dried, and kiln dried to a moisture content of between 6 and 9 percent before use.
- C. Edge Banding: All banded edges to be solid 3mm hardwood edge to match the cabinet species. Include at all cabinet faces, frames, end panels, tops, bottoms and shelving.
- D. Exposed Veneer: Veneer shall be hand selected by area prior to fabrication of the cabinet faces and exposed components for uniformity of color and grain. Selected veneer shall provide a pleasing uniform color with natural characteristics selected. Color match within individual runs

of cabinets.

1. Exterior surfaces exposed to view after installation, and the exposed interior ends, tops, and bottoms of open cases shall be constructed of Grade A, White Oak (Rift cut) slip matched of at least 1/45 inch thick veneer modified for appearance as follows: Doors shall have a vertical grain and Drawer Fronts shall have a vertical grain.
- E. Semi-Exposed Veneer: Faces used for semi-exposed areas shall be constructed of rift cut White Oak component faces, grade 1. Interior shelves shall be banded with 3mm White Oak, rift cut hardwood on front edge.
- F. Unexposed Veneer: White Oak.
 1. Finish: As selected by Architect from manufacturer's full range.
- G. Plywood Core: For casework body, interior shelving, and door/drawer heads.
 1. All panels shall be manufactured without the use of urea formaldehyde, and shall be manufactured in North America.
 2. 3/4 inch panels shall be constructed as 7 ply veneer core plywood.
 3. 1 inch panels shall be constructed as 9 ply veneer core plywood.
 4. Shelving:
 - a. Up to 36 inches in width: 3/4 inch panels.
 - b. Over 36 inches in width: 1 inch panels.
 - c. In open cabinets: 1 inch panels throughout.
 5. Door/Drawer Heads: 3 ply particle core plywood, 3/4 inch panels.
 - a. All panels shall be manufactured without the use of urea formaldehyde, and shall be manufactured in North America.
- H. Glass: Fully tempered float; ASTM C1036, Type 1, Quality Q3; ASTM C1048, tempered using horizontal tempering and complying with ANSI Z97.1; 4 mm thick minimum; exposed edges ground, and cut or drilled to receive hardware; clear.
- I. Liner Material: Removable corrosion resistant material (molded polyethylene or polypropylene).
- J. Cabinet Hardware: Manufacturer's standard styles, exposed components stainless steel.
 1. Finish of Exposed Components: No. 4 finish.
 2. Locks: 5 pin tumbler cam locks with offset cam and non-removable core, chrome plated. Key by department, unless noted otherwise.
 3. Padlock Hasps: Each drawer or door shown on the drawings shall be equipped with a padlock hasp. All hasps shall be machined from solid high grade brass. Padlock supplied by Owner.
 4. Shelves:
 - a. Shelf Supports: Adjustable, bright zinc plated angle type, 1/2 inch wide. Pin shall be 1/4 inch x 3/8 inch long pin.
 5. Swinging Doors:
 - a. Hinges: Institutional Type, 2-3/4 inch, 5-knuckle brushed chrome steel hinge, wrap around design. Provide two hinges on doors up to 36 inches in height. Provide three hinges on doors over 36 inches in height.
 - b. Catches: Adjustable type, spring activated nylon roller catches.
 - c. Pulls: Stainless steel wire pulls, 4 inches wide.
 6. Drawers:
 - a. Pulls: Stainless steel wire pulls, 4 inches wide.
 - b. Slides: Steel, full extension arms, ball bearings; Rated for 150 lbs; Accuride Model #4034 or equal.
 7. Number Plates: Aluminum brad-attached type with satin finish and indented black lettering; lettering or numbering determined by Owner.
- K. Electrical Outlet Covers: Stainless steel with grey electrical socket, coordinate with Electrical Section 26-2726 Wiring Devices.
- L. Sound Deadening Material: Inorganic, for sandwich panel fabrication.

- M. Sealant For Use in Casework Construction: Manufacturer's recommended type.
- N. Shims: Plastic bearing type. Use for leveling casework.
- O. Service Fixture Indexing: Based upon manufacturer standard indexing either forged brass or colored nylon handle index buttons. Color-coded index, letter color and symbol standards.

2.05 PEGBOARD DRYING RACK

- A. Epoxy Resin Laboratory Peg Board Drying Rack: Chemical resistant sheet materials.
 1. Drying Rack Body: 1 inch thick black epoxy.
 2. Size: 24 inches by 30 inches unless noted otherwise.
 3. Pegs: Injection molded polypropylene; 6 inch length, clear color finish. Mechanically fastened to rack body; removable and replaceable.
 4. Drip Trough: Type 304 stainless steel, with 16 gage stainless steel screen of 14x14 mesh and hose drain connection. Provide hose to drain from drip tray to sink. Undermount to drying rack. Size to fit drying rack with 4 inch width.

2.06 FABRICATION

- A. Base Units:
 1. Cabinet ends shall be banded with 3mm rolled hardwood on all exposed surfaces.
 2. Top frame assembly will be mortise and tenon construction and attached via fluted dowel to the cabinet ends. Front and rear top horizontal rails shall be 3/4 inch x 2-3/4 inch solid hardwood fastened to the cabinet ends with fluted dowels.
 3. Supply intermediate rails where locks occur and between drawers, and between all doors and drawers. Match front rail material and construction. Provide security/dust panels between doors and drawers, and between all drawers with locks.
 4. Toe space rail shall be 3/4 inch x 2-3/4 inch and fastened to cabinet ends with fluted dowels to form a 4 inch high x 2 inch deep toe space.
 5. Cabinet backs on open cabinets shall be one-piece 1/4 inch MDF core plywood, with matching cabinet veneer. All cabinet backs shall be removable without the need to remove the top drawer.
 6. Vertical dividers shall be a minimum of 3/4 inch material of matching species and grade as cabinet body. Cabinet bodies shall have 3/4 inch thick plywood cores. Secure dividers to bottom, front top rail and rear top rail with screws. Exposed edges shall be edge banded to match cabinet body species.
 7. Adjustable shelves shall be set on steel pin type shelf supports at 1-1/4 inch spacing.
 8. Drawer box back, front and sides to be of 1/2 inch Baltic Birch, 9 ply hardwood plywood. Finish same as cabinet. Use dovetail joinery on all four joints. Drawer bottom shall be 1/2 inch Baltic Birch, 9 ply
 9. hardwood plywood and grooved into all four sides of the drawer box and glued into position. Finish same as cabinet. Screw attach body to door front.
 10. Provide bottoms in all base cabinets, including drawer stacks, unless noted otherwise.
- B. Wall Cases:
 1. Case ends shall be 3/4 inch veneer core plywood banded with 3mm solid hardwood on all exposed surfaces.
 2. Case tops shall be 3/4 inch veneer core plywood banded with 3mm solid hardwood on all exposed edges and fastened to ends with fluted dowels.
 3. Bottoms of wall cases shall be 1 inch thick veneer core plywood banded with 3mm solid hardwood on exposed edge, set flush and fastened to cabinet ends with fluted dowels.
 4. Bottom of floor cases shall be 3/4 inch thick with 3mm solid hardwood on exposed edges, fastened to cabinet with fluted dowels.
 5. Backs of semi-exposed wall cabinets shall be 1/4 inch MDF plywood, with veneer matching that of the cabinet body. Back of semi-exposed tall cabinets shall be 1/2 inch plywood with veneer and core matching that of the cabinet body. Backs will be captured on the ends and shall be glued and screwed into the top and bottom. Rear rails shall be

applied to rear exterior of the cabinet.

C. Doors:

1. Full Flush overlay construction doors shall be fabricated of 3/4 inch 3 ply particle core plywood with veneers matching the cabinet body. Tall case doors shall be 1 inch thick 3 ply particle core plywood with veneers matching the cabinet body. Provide 3mm solid hardwood edge banding on all edges.
2. Provide two hinges on all doors up to 36 inches in height, and a minimum of three hinges on doors greater than 36 inches in height.

D. Full Height Cabinets:

1. Framed Glass Hinged Doors: Stile and Rail construction, fabricated of 3/4 inch x 2-3/4 solid hardwood, with tempered glass. Doors greater than 36 inches in height to receive a minimum of 3 hinges. See drawings for keying information for locks.
2. Case ends shall be 3/4 inch veneer core plywood banded with 3mm solid hardwood on all exposed surfaces.
3. Case tops shall be 3/4 inch veneer core plywood banded with 3mm solid hardwood on all exposed edges and fastened to ends with fluted dowels.
4. Bottoms of tall cases shall be 3/4 inch thick veneer core plywood banded with 3mm solid hardwood on exposed edge, set flush and fastened to cabinet ends with fluted dowels.
5. Backs of semi-exposed wall cabinets shall be 1/4 inch MDF plywood, with veneer matching that of the cabinet body. Back of semi-exposed tall cabinets shall be 1/2 inch plywood with veneer and core matching that of the cabinet body. Backs will be captured on the ends and shall be glued and screwed into the top and bottom. Rear rails shall be applied to rear exterior of the cabinet.
6. Backs of open wall cabinets shall be 1/4 inch MDF plywood, with veneer matching that of the cabinet body. Back of open tall cabinets shall be 1/2 inch plywood, with veneer and core matching that of cabinet body. Backs will be captured on ends and glued, screwed and stapled into top and bottom. Rear rails will be applied to rear exterior of the cabinet.
7. Fixed center shelves on tall cases shall be 1 inch thick banded with 3mm solid hardwood on all exposed edges on all open and hinged door cabinets. Fixed center shelves shall be fastened to ends with fluted dowels.
8. Adjustable shelves shall be set on steel pin type shelf supports at 1-1/4 inch spacing.

E. Cubbie Units:

1. Unit sizes as indicated on Drawings.
2. Material: Cubbie panels to have wood species, flitch size, flitch matching and finish to match wood lab casework. Panel veneer backer material of plywood or MDF board materials.
3. Coat Hooks: 2-prong, stainless steel, quantity and location as indicated on drawings.
4. Backs of open wall units shall be 1/2 inch plywood, with veneer and core matching that of the cabinets. Backs will be captured on ends and glued, screwed and stapled into top and bottom. Rear rails will be applied to rear exterior of the units.
5. Fixed shelves shall be 1 inch thick banded with 3mm solid hardwood on all exposed edges. Fixed shelves shall be fastened to ends with fluted dowels. Cubbie bodies shall be 3/4 inch veneer core plywood.

2.07 FINISHES

- A. Casework Finish: Finished on all interior and exterior surfaces in a flat line; oven cured process, spraying a catalyzed vinyl coating formulated for laboratory casework and must be acid/solvent resistant. Apply sealer and finish coats to all exposed and semi-exposed casework surfaces.
1. System: 7, Catalyzed Vinyl.
 2. Apply a coat of sealer and two finish coats to surfaces. Thoroughly sand surfaces between coats. Maximum film build is 6 wet mils and 3 mils dry.
 3. Finish coat shall leave a smooth, clear, satin finish with consistent coloration.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of support framing and anchors.
- B. Verify that service connections are correctly located and of proper characteristics.

3.02 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions and with SEFA 2.3.
- B. Use anchoring devices to suit conditions and substrate materials encountered.
- C. Set casework items plumb and square, securely anchored to building structure.
- D. Continuous cabinet runs shall be fastened together with joints flush, uniform and tight, with an alignment of adjacent units not to exceed 1/16 of an inch.
- E. Align cabinets to adjoining components, install filler panels where necessary to close gaps.
- F. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
- G. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
- H. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
- I. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
- J. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- K. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- L. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- M. Top edge surfaces shall be abutted in one true plane. Joints shall be flush and shall not exceed 1/8 of an inch between top units.
- N. Vented Cabinets: Install in strict compliance with manufacturer's written installation instructions.
 - 1. Install vent kits and connect to fume hood exhaust system.
 - 2. Use only rigid materials for venting. No flexible materials permitted.
- O. Countertops: Install countertops in one true plane, with ends abutting at hairline joints, and no raised edges.
- P. Replace units that are damaged, including those that have damaged finishes.
- Q. Countertop ends shall be abutted tightly and sealed with corrosion resistant sealant. Anchor tops to base casework in a single true plane with no raised edges at joints. Dress joints smooth.

3.03 ADJUSTING

- A. Adjust operating parts, including doors, drawers, hardware, and fixtures, to function smoothly. No warping or binding in door/drawer operation.

3.04 CLEANING

- A. Clean all components.

3.05 PROTECTION

- A. Do not permit finished casework to be exposed to continued construction activity.
- B. Protect casework and countertops from ongoing construction activities. Prevent installers from standing on or storing tools and materials on casework or countertops.
- C. Repair damage that occurs prior to Date of Substantial Completion, including finishes, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION

**SECTION 12 4813
ENTRANCE FLOOR MATS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum entrance floor grilles.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating properties of walk-off surface, component dimensions and recessed frame characteristics.
- C. Shop Drawings: Indicate dimensions and details for recessed frame.
- D. Samples: Submit two samples, 12 x 12 inches in size illustrating pattern, color, finish, and edging.
- E. Maintenance Data: Include cleaning instructions and stain removal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Pedigrid G1 Recessed Level Base Frame LB by Ronick Matting Systems: www.ronick.com.
- B. Acceptable Product Option: Pedimat M1 Recessed Entrance Mat by Construction Specialties.
- C. Entrance Floor Grilles and Gratings:
 - 1. Arden Architectural Specialties, Inc: www.ardenarch.com.
 - 2. Babcock-Davis: www.babcockdavis.com.
 - 3. Construction Specialties, Inc; Entrance Grids: www.c-sgroup.com.
 - 4. Nystrom, Inc: www.nystrom.com.
 - 5. Pawling Corporation: www.pawling.com.
 - 6. Reese Enterprises, Inc: www.reeseusa.com.
 - 7. Substitutions: See Kraus-Anderson Special Requirements.

2.02 ENTRANCE FLOOR GRILLES AND GRATINGS

- A. Entrance Floor Grilles (EM-1): Recessed extruded aluminum grille assembly with nominal 1-1/2 inch (38 mm) wide tread strips running perpendicular to traffic flow, slots between treads, and perimeter frame forming sides of recess; grille hinged for access to recess.
 - 1. Recess Depth: 1-13/16 inches (46.6 mm) - PediGrid.
 - a. 7/16" Pedimat M1 by CS Option.
 - 2. Tread Surfaces: Polypropylene brush.
 - 3. Heavy Duty Carpet Color: GRAPHITE (9325) - PediGrid
 - a. ANTRHACITE (9332) - PediMat M1 by CS Option.
 - 4. Frame: Anodized aluminum for embedding in concrete; minimal exposed trim; stud or hook concrete anchors.
- B. Mounting: Top of non-resilient members level with adjacent floor.
- C. Structural Capacity: Capable of supporting a rolling load of 400 pounds (181.4 kg) without permanent deformation or noticeable deflection.
- D. Vibration Resistant Fabrication: All members welded, riveted, or bolted; no snap or friction connections.

2.03 FABRICATION

- A. **Template service** to be provided by the manufacturer to ensure a proper fit within the Vestibules and around columns and wall projections. See drawings for configuration.
- B. Construct recessed mat frames square, tight joints at corners, rigid. Coat surfaces with protective coating where in contact with cementitious materials.

- C. Fabricate mats in single unit sizes; fabricate multiple mats where indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor opening for mats are ready to receive work.

3.02 PREPARATION

- A. Mats: Verify size of floor recess before fabricating mats.
- B. Vacuum clean floor recess.

3.03 INSTALLATION

- A. Install frames to achieve flush plane with finished floor surface.
- B. Install walk-off surface in floor recess flush with finish floor after cleaning of finish flooring.

3.04 TOLERANCES

- A. Maximum Gap Formed at Recessed Frame From Mat Size: 1/4 inch (6 mm).

END OF SECTION

**SECTION 12 6100
FIXED AUDIENCE SEATING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fixed, upholstered theater chairs.
- B. Support standards.
- C. Chair accessories.

1.02 RELATED REQUIREMENTS

- A. Section 12 6613 - Telescoping Bleachers.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details, chair layouts and dimensions and seat numbering scheme.
- D. Selection Samples: Manufacturer's color charts and swatches for fabric upholstery, indicating full range of materials, colors, and patterns available.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer certified in writing by the seating manufacturer to be qualified for installation of specified seating.
- B. Fire Retardance of Upholstered Seating: Self-extinguishing when mock-up is exposed to smoldering cigarettes in accordance with ASTM E1352 or NFPA 261.
- C. Install in accordance with ADA requirements. Provide minimum number of accessible seats as required.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver seats to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.
- B. Store seating units in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.07 WARRANTY

- A. Provide manufacturer's warranty covering the material and workmanship for the specified warranty period from date of final acceptance.
- B. Warranty Periods:
 - 1. Structural Components: Five years.
 - 2. Operating Mechanisms: Five years.
 - 3. Plastic, Wood, and Painted Components: Five years.
 - 4. Upholstry Fabric: One year or per fabric provider, whichever is greater.
 - 5. Electric Components: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fixed Theater Seating:
 - 1. MobiliarioSeating; Conventional Model Low Back Chari with Lumbar Support: www.mobiliario.net.
 - 2. Irwing Seating Company; Marquee Model with lumbar back support: www.irwinseating.com.

3. Hussey Seating Company: www.husseyseating.com/#sle.
- B. Substitutions: See Section 01 6000 - Product Requirements.
- C. Provide all theater seating by one manufacturer.

2.02 MATERIALS

- A. Sheet Steel: ASTM A879/A879M, Commercial Steel (CS) or Drawing Steel (DS) electrogalvanized sheet, 04Z (12G) coating class on both surfaces; chemically treated for baked enamel finish.
- B. Steel Plates, Bars, and Tubes: ASTM A36/A36M.
- C. Exposed Hardwood: Solid lumber selected for absence of visible defects; birch, northern hard maple, white oak, or species standard with manufacturer.
- D. Laminated Plastic: NEMA LD 3, Type 1, Grade GP 50, nominal thickness 0.050 in (1.27 mm); colors and patterns as selected from manufacturer's standards.
- E. Fiberglass: Molded plastic material with not less than 30 percent glass fiber reinforcement and integral color pigments.
- F. Upholstery Fabric: ASTM D3597 heavy-duty plain woven nylon fabric, treated to resist cigarette ignition and staining; color and pattern as selected from manufacturer's standards.

2.03 UPHOLSTERED CHAIRS

- A. Fixed seating system designed to permit radial installation using common middle support standards in each row and aisle standards aligned as indicated on drawings. Width of seats not less than 22 inches (559 mm), except exit seat locations may be reduced to 20 inches (508 mm) to complete specific row dimensions.
- B. Backs: Fixed type; two-panel construction with fabric covering over padding and protective back panel, with installed height not less than 32 inches (813 mm) above finished floor.
 1. Structural Support: One-piece die-formed steel sheet.
 2. Covering: Fabric bonded to padding and fastened by upholstery technique that facilitates replacement.
 3. Rear Panel: One-piece injection molded high-impact plastic, with scuff-resistant textured surface.
- C. Seats: Hinged type, constructed to permit reupholstering without removing seat from chair.
 1. Steel Seat Construction: One-piece sheet steel pan construction, reinforced at stress points; supporting not fewer than 16 coil springs or five non-sag serpentine springs. Separate padding from springs with burlap sheeting cemented to polyurethane foam padding formed with minimum thickness of 1-3/4 in (44 mm). Upholster with fabric sewn into box construction without welts and securely fastened to supporting frame to provide smooth, wrinkle-free surface.
- D. Hinges: Self-lubricating, noiseless steel hinges with brass alloy bearings or nylon bushings, equipped with spring mechanism that causes unoccupied seat to rise automatically to uniform 3/4 fold, with 100 percent fold when additional pressure is applied.
- E. Arm Rests: Locate at aisles and between chairs; mount to support standard with concealed fasteners; exposed surfaces of solid hardwood lumber with smoothed edges.
- F. End Panels: One piece panels fastened securely to aisle standards with concealed fasteners, configured as follows:
 1. Shape: Rectangular.
 2. Finish: Plastic laminate.

2.04 STANDARDS

- A. Support Standards: Tubular steel with welded mounting points for backs, seats, and arm rests, and welded floor anchor plates.

2.05 ACCESSORIES

- A. Folding Tablet Arms: At standard to right side of each seat, provide manufacturer's standard fold-away tablet arm assembly, with hinge and swivel mechanism securely fastened to underside of writing surface and designed to provide solid support in the open position and semi-automatic return to stowed position beneath right arm rest and parallel to right standard.
 - 1. Finish: Plastic laminate both sides, with smooth, rounded edges.
 - 2. Size: Writing surface not less than 150 sq inches (0.0968 sq. m).
- B. Seat and Aisle Numbers: Manufacturer's standard seat numbers securely fastened to front edge of folding seats and row numbers securely fastened to aisle arm rests; anodized aluminum finish, with letters and numbers countersunk and filled with black paint.
- C. Accessible seating shall on the seating layout drawings and designed to allow an individual to transfer from a wheelchair to the theatre chair. The aisle standard shall be equipped with an armrest capable of lifting to a position parallel with the support column, opening sideways access to the seat. Aisle standards so equipped shall be provided with a label, displaying an easily recognizable "handicapped" symbol. Decorative requirements of aisle standards are waived for the handicapped access standards.

2.06 FINISHES

- A. Ferrous Metals: Manufacturer's standard two-coat baked enamel finish, applied over conversion coating appropriate to base metal.
 - 1. Color and Gloss: As selected from manufacturer's standard choices.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 INSTALLATION

- A. Comply with manufacturer's installation instructions and approved shop drawings.
- B. Anchor support standards securely to substrate with at least two anchoring devices recommended by manufacturer.
 - 1. Place standards in each row laterally so the standards at the aisle will be in alignment.
 - 2. Vary width of seats and backs as required to optimize sightlines, and comply with the ADA Standards for row and aisle widths.
 - 3. In curved rows, install standards to form smooth radius, without breaks or angled chords

3.03 ADJUSTING

- A. Adjust seat mechanisms to ensure that seats in each row are aligned when unoccupied.
- B. Repair minor abrasions and imperfections in painted finishes with a coating that matches factory-applied finish; replace units that cannot be repaired to unblemished appearance.
- C. Replace upholstery fabric damaged or soiled during installation.

END OF SECTION