Project Manual



LEE'S SUMMIT MEDICAL CENTER

Lee's Summit Medical Center Hybrid OR Addition

2100 SE Blue Parkway Lee's Summit, Missouri

Volume 1 of 2

(Divisions 00 thru 14)

March 23, 2020

ACIB Project #3-19058



Project Manual



LEE'S SUMMIT MEDICAL CENTER

Lee's Summit Medical Center Hybrid OR Addition

2100 SE Blue Parkway Lee's Summit, Missouri

Volume 2 of 2

(Divisions 15 thru 32)

March 23, 2020

ACIB Project #3-19058



DISCLAIMER OF RESPONSIBILITY - ARCHITECT

I hereby state that all documents intended to be authenticated by my seal are limited to:

A. PROJECT MANUAL: TABLE OF CONTENTS:

DIVISION 00	DIVISION 01	DIVISION 02	DIVISION 03	DIVISION 05
DIVISION 06	DIVISION 07	DIVISION 08	DIVISION 09	DIVISION 10
DIVISION 12	DIVISION 13			

NOTE: DIVISIONS LISTED INCLUDE ALL SECTIONS LISTED IN THAT DIVISION.

B. DRAWINGS:

A0.1	A0.2	A0.3	A0.4	A0.5
A0.6	AD1.1	A2.1	A2.2	A3.1
A4.1	A4.2	A6.1	A6.2	A7.1
A7.2	F1.1			

I hereby disclaim any responsibility for all other specifications, estimates, reports or other documents or instruments related to or intended to be used for any part or parts of this architectural project.

SEAL:



DISCLAIMER OF RESPONSIBILITY - CIVIL

I hereby state that all documents intended to be authenticated by my seal are limited to:

A. <u>PROJECT MANUAL:</u>

311000	Site Clearing		
312000	Earth Moving		
321313	Concrete Paving		
329200	Turf and Grasses		

B. DRAWINGS:

C100		

I hereby disclaim any responsibility for all other specifications, estimates, reports or other documents or instruments related to or intended to be used for any part or parts of this architectural project.

SEAL:



DISCLAIMER OF RESPONSIBILITY: ELECTRICAL

I hereby state that all documents intended to be authenticated by my seal are limited to:

A. <u>PROJECT MANUAL:</u>

26 05 00	26 05 19	26 05 26	26 05 27	26 05 33
26 27 26	26 51 00	27 05 01	27 05 02	27 15 00
28 3 00				

NOTE: DIVISIONS LISTED INCLUDE ALL SECTIONS LISTED IN THAT DIVISION.

B. DRAWINGS:

E0.1	E0.2	E0.3	E0.4	E1.1
E4.1	E4.2	E4.3	E5.1	E6.1
E6.2				

I hereby disclaim any responsibility for all other specifications, estimates, reports or other documents or instruments related to or intended to be used for any part or parts of this architectural project.



Name: Darin Douglas Crowder, P.E. State / Registration No.: 2004017152 Discipline: Electrical Engineering Title: Senior Project Manager Company Name: Professional Engineering Consultants, P.A

DISCLAIMER OF RESPONSIBILITY: MECHANICAL

I hereby state that all documents intended to be authenticated by my seal are limited to:

A. <u>PROJECT MANUAL:</u>

21 05 00	21 13 13	22 05 00	22 05 23	22 05 29
22 05 48	22 05 53	22 07 00	22 08 00	22 11 16
22 11 19	22 13 16	22 13 19	22 14 16	22 14 19
22 43 00	22 61 13	22 62 13	22 63 13	23 05 00
23 15 13	23 05 19	23 05 23	23 05 29	23 05 48
23 05 53	23 05 93	23 07 00	23 08 00	23 09 00
23 21 13	23 21 14	23 21 16	23 22 13	23 22 16
23 23 00	23 25 00	23 31 13	23 33 00	23 34 23
23 36 00	23 37 13	23 62 00	23 74 13	23 81 23

NOTE: DIVISIONS LISTED INCLUDE ALL SECTIONS LISTED IN THAT DIVISION.

B. DRAWINGS:

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MD1.0	M1.0	M2.0	M3.0	M3.1
M2.0	M3.0	M4.0	M4.1	M5.0
M5.1	MR1.0			

I hereby disclaim any responsibility for all other specifications, estimates, reports or other documents or instruments related to or intended to be used for any part or parts of this architectural project.

SEAL:



Name: Brandon W. Claassen, P.E. State / Registration No.: 2019000019 Discipline: Mechanical Engineering Title: Principal Company Name: Professional Engineering Consultants, P.A

DISCLAIMER OF RESPONSIBILITY: STRUCTURAL

I hereby state that all documents intended to be authenticated by my seal are limited to:

A. PROJECT MANUAL:

03 30 00	04 22 00	05 12 00	05 31 22	

NOTE: DIVISIONS LISTED INCLUDE ALL SECTIONS LISTED IN THAT DIVISION.

B. DRAWINGS:

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S3.2	S4.1	S5.1		

I hereby disclaim any responsibility for all other specifications, estimates, reports or other documents or instruments related to or intended to be used for any part or parts of this architectural project.

SEAL:



Name: Daniel L. Wethington, P.E. State / Registration No.: 1999137726 Discipline: Structural Engineering Title: Structural Team Lead Company Name: Professional Engineering Consultants, P.A.

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SECTION 01 10 00 SUMMARY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Definitions.
- B. Work Covered by Contract Documents.
- C. Work by Owner.
- D. Codes.
- E. Specification and Drawing Conventions.
- F. Intent of the Contract Documents.
- G. Work Sequence.

1.03 DEFINITIONS:

- A. Developer Spec Term: Wherever the term "Developer Spec Term" is used, it shall mean Developer, located at Developer Address. Developer is the owner of the building.
- B. Owner: Wherever the term "Owner" is used, it shall mean HCA Midwest, located Owner Address/City/State/Zip. HCA Midwest shall be the tenant of the interior space being constructed.
- C. Architect: Wherever the term "Architect" is used, it shall mean ACI / Boland Inc., located at Architect Address. ACI / Boland Inc. is the Design Professional of Record for the Project.
- D. CM Spec Term: Wherever the term "CM Spec Term" is used, it shall mean CM Company Name (underlined), located at CM Address/City/State/Zip). The Construction Manager is responsible for overseeing and directing the Work.
- E. Contractor: Wherever the term "Contractor" is used, it shall mean the trade-contractor who holds a prime contract with the a portion of the Work.
- F. MEPF Consultant: Wherever the term "MEPF Consultant" is used, it shall mean MEP Company Name (underlined), who have prepared the mechanical, electrical, plumbing, and fire protection design drawings and specifications for the Project.
- G. Civil Engineer: Wherever the term "Civil Engineer" is used, it shall mean Civil Company Name (underlined), who has prepared the civil design drawings and specifications for the Project.

1.04 WORK COVERED BY CONTRACT DOCUMENTS:

- A. The Work is defined by the Contract Documents and consists of the following:1. Building Addition: 2,200SF (approx.)
- B. Categories of Work include, but not limited to, the following:
 - 1. General construction.
 - 2. Mechanical, electrical plumbing, and fire protection Work.
- C. Contract Type: Coordinate with Construction Manager.

1.05 DESCRIPTION OF TENANT FINISH WORK

- Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.
- B. Scope of alterations work is indicated on drawings.
- C. Plumbing: Alter existing system and add new construction, keeping existing in operation.
- D. HVAC: Alter existing system and add new construction, keeping existing in operation.

- E. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation.
- F. Fire Suppression Sprinklers: Alter existing system and add new construction, keeping existing in operation.
- G. Fire Alarm: Alter existing system and add new construction, keeping existing in operation.
- H. Telephone: Alter existing system and add new construction, keeping existing in operation.
- I. Security System: Alter existing system and add new construction, keeping existing in operation.

1.06 PROJECT SCHEDULE

A. Coordinate project schedule with Construction Manager.

1.07 WORK BY OTHERS

- A. General: Contractor's shall cooperate fully with the Developer and Tenant Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner.
 - 1. Coordinate the Work of this Contract with work performed by the Developer and Tenant Owner.
- B. <u>OWNER FURNISHED / OWNER INSTALLED WORK (OFOI)</u>
 - 1. The Owner will procure separate contracts with vendors to furnish and install furniture, fixtures, and equipment shown on the drawings.
 - 2. Items noted on Drawings as "OF/OI" will be furnished and installed by the Owner.
 - 3. Items noted on Drawings as "NIC" (Not in Contract) will be supplied and installed by Owner.

C. OWNER FURNISHED / CONTRACTOR INSTALLED WORK (OFCI)

- 1. General: Products and items indicated in the Contract Documents "OF/CI" will be provided by the Owner under separate contracts for final connection or installation by the Contractor/s.
 - a. Owner's Responsibilities for Owner Furnished / Contractor Installed Work:
 - 1) Arrange for and deliver shop drawings, product data, and samples to the Contractor/s.
 - 2) Arrange and pay for product delivery to site. After delivery, inspect products jointly with Contractor/s.
 - 3) Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 4) Arrange for manufacturer's warranties, inspections and service.
 - b. Contractor's Responsibilities for Owner Furnished / Contractor Installed Work:
 - 1) The Contractor shall coordinate and schedule with the Owner the requirements and timing required for prompt and proper incorporation into the work.
 - 2) Review Owner furnished shop drawings, product data, and samples to determine if information is adequate as needed for installation.
 - 3) Receive and unload products at site; inspect for completeness or damage, to the extent the Contractor is responsible for installation of Owner provided Work.
 - 4) Handle, store and install Owner furnished Work.
 - 5) Repair or replace items damaged by construction operations.

1.08 BUILDING OCCUPANCY

A. The Owner intends to occupy the Project upon Substantial Completion.

1.09 CODES

- A. The applicable Codes for this Project include:
 - 1. 2018 International Building Code
 - 2. 2018 International Plumbing Code
 - 3. 2018 International Mechanical Code
 - 4. 2018 International Fire Code

- 5. 2017 National Electrical Code (NFPA 70)
- 6. 2012 Life Safety Code (NFPA 101)
- 7. 2010 ADA Standards for Accessible Design

1.10 USE OF SITE

A. Coordinate use of project site with the Contractor.

1.11 WORK RESTRICTIONS

- A. Coordinate with Contractor, including:
 - 1. Work hours;
 - 2. Utility outages and shutdowns;
 - 3. Noise, vibration, and odors;
 - 4. Limitations on use of public streets and with other requirements of authorities having jurisdiction.

1.12 IDENTIFICATION OF ON-SITE PERSONNEL

A. Coordinate with Contractor.

1.13 SMOKING AND CONTROLLED SUBSTANCES

- A. Coordinate with Contractor.
 - 1. Smoking is not permitted in the building or or on the property.
 - 2. Use of controlled substances on the property is not permitted.

1.14 FIREARMS

A. Firearms: Firearms are not permitted on the property.

1.15 BACKGROUND CHECKS

A. Coordinate with Contractor.

1.16 UNAUTHORIZED ALIEN EMPLOYMENT

A. Coordinate with Contractor.

1.17 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

A. Refer to Section 01 20 00 - Price, Payment, and Contract Modification Procedures

1.18 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

1.19 INTENT OF THE CONTRACT DOCUMENTS

A. Intent: Drawings and specifications are intended to provide the basis for proper completion of the Work. Anything not expressly set forth but which is reasonable implied or necessary for proper performance of the project shall be included.

B. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Construction Manager shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

1.20 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Contractor.
- PART 2 PRODUCTS NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 45 33

CODE-REQUIRED SPECIAL INSPECTIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.

1.03 RELATED REQUIREMENTS

Section 01 30 00 - Administrative Requirements

Section 01 40 00 - Quality Requirements

Section 01 60 00 - Product Requirements

1.04 DEFINITIONS

- A. Code or Building Code: ICC (IBC)-2012 Edition of the International Building Code and specifically, Chapter 17 Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. International Accreditation Service, Inc. (IAS).
- D. National Institute of Standards and Technology (NIST).
- E. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by the Owner or Contractor for the purposes of quality assurance and contract administration.

1.05 REFERENCES

- A. ACI 318 Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
- B. ICC (IBC)-2015 International Building Code; 2015.
- C. AISC 341 Seismic Provisions for Structural Steel Buildings; 2016.
- D. AISC 360 Specification for Structural Steel Buildings; 2010.
- E. ASCE 7 Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- F. ASTM C31/C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2015ae1.
- G. ASTM C172/C172M Standard Practice for Sampling Freshly Mixed Concrete; 2014a.
- ASTM D3740 Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- I. ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.

- J. ASTM E543 Standard Specification for Agencies Performing Nondestructive Testing; 2015.
- K. ASTM E2570/E2570M Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage; 2007, with Editorial Revision (2014).
- L. AWCI 117 Technical Manual 12-B; Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide; 2014.
- M. AWS D1.4/D1.4M Structural Welding Code Reinforcing Steel; 2011.
- N. IAS AC89 Accreditation Criteria for Testing Laboratories; 2010.
- O. IAS AC291 Accreditation Criteria for Special Inspection Agencies; 2017.
- P. ICC (IBC)-2012 International Building Code; 2012.

1.06 SUBMITTALS

- A. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency shall:
 - 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 - 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
 - 4. Submit documentation that Special Inspection Agency is accredited by IAS according to IAS AC291.
- B. Testing Agency Qualifications: Prior to the start of work, the Testing Agency shall:
 - 1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 - 3. Submit certification that Testing Agency is acceptable to AHJ.
 - 4. Submit documentation that Testing Agency is accredited by IAS according to IAS AC89.
- C. Smoke Control Testing Agency Qualifications: Prior to the start of work, the Testing Agency shall:
 - 1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 - 2. Submit documentary evidence that agency has appropriate credentials and documented experience in fire protection engineering, mechanical engineering and HVAC air balancing.
 - 3. Submit certification that Testing Agency is acceptable to AHJ.
 - 4. Submit documentation that Testing Agency is accredited by IAS according to IAS AC89.
- D. Manufacturer's Qualification Statement: Manufacturer shall submit documentation of manufacturing capability and quality control procedures. Include documentation of AHJ approval.
- E. Fabricator's Qualification Statement: Fabricator shall submit documentation of fabrication facilities and methods as well as quality control procedures. Include documentation of AHJ approval.
- F. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit two copies of report; one to Architect and one to the AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of product and specifications section.

- f. Location in the Project.
- g. Type of special inspection.
- h. Date of special inspection.
- i. Results of special inspection.
- j. Compliance with Contract Documents.
- 2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
- G. Test Reports: After each test or inspection, promptly submit two copies of report; one to Architect and one to AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test or inspection.
 - h. Date of test or inspection.
 - i. Results of test or inspection.
 - j. Compliance with Contract Documents.
- H. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
 - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect and AHJ.
- I. Manufacturer's Field Reports: Submit reports to Architect and AHJ.
 - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the contract documents.

1.07 SPECIAL INSPECTION AGENCY

- A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
- B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.
- C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 TESTING AND INSPECTION AGENCIES

- A. Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.09 QUALITY ASSURANCE

- A. Special Inspection Agency Qualifications:
 - 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
 - 2. Accredited by IAS according to IAS AC291.
- B. Testing Agency Qualifications:

- 1. Independent firm specializing in performing testing and inspections of the type specified in this section.
- 2. Accredited by IAS according to IAS AC89.
- C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SPECIAL INSPECTIONS - GENERAL

- A. The Owner will employ the services of a Special Inspection Agency to perform inspections during construction on the types of work listed in Section 1705 of the 2012 International Building Code (IBC), including:
 - 1. Steel construction (Section 1705.2)
 - 2. Concrete construction (Section 1705.3)
 - 3. Masonry construction (Section 1705.4)
 - 4. Wood construction (Section 1705.5)
 - 5. Soils (Section 1705.6)
 - 6. Driven deep foundations (Section 1705.7)
 - 7. Cast-in-place deep foundations (Section 1705.8)
 - 8. Helical pile foundations (Section 1705.9)
 - 9. Wind resistance (Section 1705.10)
 - 10. Seismic resistance (Section 1705.11)
 - 11. Seismic resistance (Section 1705.12)
 - 12. Sprayed fire-resistant materials (Section 1705.13)
 - 13. Mastic and Intumescent fire-resistant materials (Section 1705.14)
 - 14. Exterior insulation and finish systems (EIFS) (Section 1705.15)
 - 15. Fire-resistant penetrations and joints (Section 1705.16)
 - 16. Smoke control (Section 1705.17)
- B. SPECIAL INSPECTIONS FREQUENCY
- C. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
 - 1. Continuous Special Inspection: Special Inspection Agency shall be present in the area where the work is being performed and observe the work at all times the work is in progress.
 - 2. Periodic Special Inspection: Special Inspection Agency shall be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

3.02 SPECIAL INSPECTIONS - STEEL CONSTRUCTION

- A. Perform inspections of steel construction in accordance with the requirements of Section 1705.2 of the 2015
- B. Structural Steel: Special inspections for structural steel shall be in accordance with the requirements of AISC 360
- C. Steel Construction (Other than structural steel): Required verification and inspection of steel construction per Table 1705.2.2 of the 2012 International Building Code (ICC (IBC)-2012), including:
 - 1. Material verification of cold-formed steel deck:
 - 2. Inspection of welding:
 - a. Floor and/or roof deck welds per AWS D1.3; periodic.
 - b. Reinforcing Steel: Comply with AWS D1.4/D1.4M and ACI 318, Section 3.5.2.

3.03 SPECIAL INSPECTIONS - CONCRETE CONSTRUCTION

A. Inspections by Owner: Perform required verification and inspection of concrete construction, per Table 1705.3 of the 2010 International Building Code (IBC).

- 1. Exception: Concrete testing and sampling performed by Concrete Contractor.
- B. The Concrete Contractor shall employ the services of a Special Inspection Agency to perform sampling and testing of concrete specimens in accordance with the requirements of Table 1705.3, Item No. 6, of the 2012 International Building Code, including:
 - 1. Fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete. Verify compliance with ASTM C172/C172M, ASTM C31/C31M and ACI 318; continuous.

3.04 SPECIAL INSPECTIONS - MASONRY CONSTRUCTION

- A. Masonry construction shall be inspected and verified in accordance with the quality assurance requirements of TMS 402 / ACI 530 / ASCE 5 and TMS 602 / ACI 530.1 / ASCE 6.
 - 1. Exceptions:
 - a. Empirically designed masonry and masonry veneer in structures classified as Risk Category I, II, or III.
- B. Occupancy (Risk) Category: II, per 2012 IBC, Section 1604.5

3.05 SPECIAL INSPECTIONS - SOILS

- A. Perform required verification and inspection of soils, per Table 1705.6 of the 2012 International Building Code (IBC).
- B. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report:
 - 1. Design bearing capacity of material below shallow foundations; periodic.
 - 2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
 - 3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
 - 4. Subgrade, prior to placement of compacted fill; periodic.
- C. Testing: Classify and test excavated material; periodic.

3.06 SPECIAL INSPECTIONS FOR SPRAYED FIRE-RESISTANT MATERIALS

- A. When applicable, special inspections for sprayed fire-resistive materials applied to floor, roof, and wall assemblies and structural members shall be in accordance with Sections 1705.13 of the 2012 IBC.
- B. Sprayed Fire Resistant Materials, General:
 - 1. Verify compliance of sprayed-fire resistant materials with specific fire-rated assemblies indicated in approved contract documents, and with applicable requirements of the building code.
 - 2. Perform special inspections after rough installation of electrical, mechanical, plumbing, automatic fire sprinkler and suspension systems for ceilings.
- C. Physical and visual tests: Verify compliance with fire resistance rating.
 - 1. Condition of substrates; periodic.
 - 2. Thickness of sprayed fire resistant material; periodic.
 - 3. Density of sprayed fire resistant material in pounds per cubic foot (kg per sq m); periodic.
 - 4. Bond strength (adhesion and cohesion); periodic.
 - 5. Condition of finished application; periodic.
- D. Structural member surface conditions:
 - 1. Inspect structural member surfaces before application of sprayed fire resistant materials; periodic.
 - 2. Verify preparation of structural member surfaces complies with approved contract documents and manufacturer's written instructions; periodic.

3.07 SPECIAL INSPECTIONS - MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS

A. When applicable, perform inspections and associated testing and sampling of mastic and intumescent fire-resistive coatings, in accordance with the requirements of Section 1705.15 of the 2012 International Building Code.

1. Verify mastic and intumescent fire resistant coatings comply with AWCI 12-B and the fire resistance rating indicated on approved contract documents.

3.08 SPECIAL INSPECTIONS - EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)

- A. Special Inspections: Not required per Section 1705.15 of the 2012 IBC.
- B. Verify water resistive barrier coating applied over sheathing complies with ASTM E2570/E2570M.

3.09 SPECIAL INSPECTIONS FOR FIRE RESISTANT PENETRATIONS AND JOINTS

- A. Occupancy (Risk) Category: II, per 2012 IBC, Section 1604.5
 - 1. Special Inspections not required per Section 1705.16 of the 2012 IBC.

3.10 SPECIAL INSPECTIONS - SMOKE CONTROL

- A. When applicable, perform inspections and associated sampling and testing of smoke control in accordance with IBC 2012, Section 1705.17. Test smoke control systems as follows:
 - 1. During erection of ductwork and prior to concealment for the purpose of leakage testing and recording of device location.
 - 2. Prior to occupancy and after sufficient completion for the purposes of pressure difference testing, flow measurements and detection and control verification.

3.11 SPECIAL INSPECTIONS - SEISMIC RESISTANCE

- A. Design Requirements:
 - 1. Building Code: 2012 IBC
 - 2. Occupancy (Risk) Category (Section 1604.5): II
 - 3. Site Classification (Section 1613.3.2): C
 - 4. Seismic Design Category (Section 1613.3.5): B
- B. Special Inspections: Seismic Design Category A and B only: Special inspections not required.
- C. Special Inspections:
 - 1. Seismic Force-Resisting Systems (Seismic Design Category C, D, E, or F only):
 - a. Structural Steel: Comply with the quality assurance requirements of AISC 341.
 - b. Structural Wood
 - c. Cold-Formed Steel Light Frame Construction
 - Architectural Components: Erection and fastening of exterior cladding, interior and exterior non-bearing walls, interior and exterior veneer (Seismic Design Category D, E or F only); periodic.
 - 3. Mechanical and Electrical Components:
 - a. Anchorage of electric equipment required for emergency or standby power systems (Seismic Design Category C, D, E or F only); periodic.
 - b. Installation and anchorage of other electrical equipment (Seismic Design Category E or F only); periodic.
 - c. Installation of piping systems for flammable, combustible or highly-toxic contents and associated mechanical units (Seismic Design Category C, D, E or F only); periodic.
 - d. Installation of HVAC ductwork that will contain hazardous materials (Seismic Design Category C, D, E or F only); periodic.
 - e. Vibration isolation systems where the approved contract documents require a nominal clearance of 1/4 inch (6.35 mm) or less between support frame and seismic restraint (Seismic Design Category C, D, E or F only); periodic.
 - 4. Storage Racks (Seismic Design Category D, E or F only): Anchorage; periodic.
- D. Testing and Qualification for Seismic Resistance:
 - 1. Seismic Force-Resisting Systems (Seismic Design Category C, D, E, or F only): Comply with Sections 1705.12.1 and 1705.12.2, as applicable.
 - 2. Designated Seismic System (Seismic Design Category C, D, E or F only): Comply with Section 1705.12.3 and ASCE 7 Section 13.2.2
 - 3. Architectural, Mechanical, and Electrical Components (Seismic Design Category C, D, E, or F only): Comply with Section 1705.12.3 and ASCE 7 Section 13.2.1

3.12 OTHER SPECIAL INSPECTIONS

- A. Provide for special inspection of work that, in the opinion of the AHJ, is unusual in nature.
- B. For the purposes of this section, work unusual in nature includes, but is not limited to:
 1. Construction materials and systems that are alternatives to materials and systems prescribed by the building code.
 - 2. Unusual design applications of materials described in the building code.
 - 3. Materials and systems required to be installed in accordance with the manufacturer's instructions when said instructions prescribe requirements not included in the building code or in standards referenced by the building code.
- C. Alternative Test Procedures: Where approved rules and standards do not exist, test materials and assemblies as required by AHJ, or provide AHJ with documentation of quality and manner in which those materials and assemblies are used.

3.13 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency shall:
 - 1. Verify samples submitted by Contractor or Owner comply with the referenced standards and the approved contract documents.
 - 2. Perform specified sampling and testing of products in accordance with specified REFERENCES.
 - 3. Ascertain compliance of materials and products with requirements of Contract Documents.
 - 4. Promptly notify Construction Manager or Architect of observed irregularities or non-conformance of work or products.
 - 5. Submit reports of all tests or inspections specified.
- B. Limits on Special Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the work.
- C. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- D. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.14 TESTING AGENCY DUTIES AND RESPONSIBILITIES

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Contractor of observed irregularities or non-conformance of work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests or inspections specified.
- B. Limits on Testing or Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the work.
- C. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- D. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.15 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. Contractor Responsibilities, General:
 - 1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
 - 2. Cooperate with agency and laboratory personnel; provide access to the work, to manufacturers' facilities, and to fabricators' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to work to be tested or inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
 - c. To facilitate tests or inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify testing or inspection agency 24 hours prior to expected time for operations requiring testing or inspection services.
 - 5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required beyond specified requirements.

END OF SECTION

SECTION 02 30 50

AVAILABLE SITE INFORMATION

PART 1 GENERAL

1.01 EXISTING SITE CONDITIONS

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders, as follows:
- B. Geotechnical Report: Prepared by Kleinfelder, dated 11/09/2005.
 - 1. Availability:
 - a. A copy of the geotechnical report is included in the Project Manual at the end of this Section.
 - b. Electronic copy may be available from Geotech Engineer.
 - 2. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect.
 - 3. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
 - 4. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.
 - 5. Geotechnical Report is for Bidder's and Contractor's review and information only. Contractor's and Bidder's are responsible for making their own determination of site conditions as may be necessary to prepare their bids and perform the Work.
 - a. Variations between conditions indicated and actual conditions will not be considered reason for change in Contract amount or time.
- C. Neither the Owner nor the Architect guarantees the accuracy and completeness of information and data provided on the survey and geotechnical report, including that concerning type and location of underground materials and utilities.
- D. Report discrepancies between conditions shown and actual conditions to the Architect.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 02 41 00 DEMOLITION

PART 2 PRODUCTS

1.01 MATERIALS

A. Coordinate with Civil Engineering Documents.

PART 3 EXECUTION

2.01 SCOPE

- A. Remove the portion of the existing building designated on the Drawings.
- B. Remove paving and curbs as required to accomplish new work.

2.02 EXISTING UTILITIES

A. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

SECTION 02 41 00

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Selective Building Demolition:
 - 1. Selective demolition of interior partitions, systems, and building components designated to be removed.
 - 2. Selective demolition of exterior facade, structures, and components designated to be removed.
 - 3. Protection of portions of building adjacent to or affected by selective demolition.
 - 4. Removal of abandoned utilities and wiring systems.
 - 5. Notification to Owner of schedule of shut-off of utilities which serve occupied spaces.
 - 6. Pollution control during selective demolition, including noise control.
 - 7. Removal and legal disposal of materials.
 - 8. Protection of designated site improvements and adjacent construction.
 - 9. Salvage of designated items.
 - 10. Interruption, capping or removal of utilities as applicable.
- B. Selective Site Demolition:
 - 1. Demolition of designated site improvements including paving, curbing, site walls, and utility structures.
 - 2. Demolition of below-grade foundations and site improvements to depth to avoid conflict with new construction or site work.
 - 3. Removal of hollow items or items which could collapse.
 - 4. Salvage of designated items.
 - 5. Protection of site work and adjacent structures.
 - 6. Disconnection, capping, and removal of utilities.
 - 7. Pollution control during building demolition, including noise control.
 - 8. Removal and legal disposal of materials.
 - 9. Designated site improvements and adjacent construction.
 - 10. Interruption, capping or removal of utilities as applicable.

1.03 RELATED SECTIONS

Division 21 - Fire Suppression

Division 22 - Plumbing

Division 23 - HVAC

Division 26 - Electrical

Division 31 - Earthwork

- Division 32 Exterior Improvements
- Division 33 Utilities

1.04 REFERENCES

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

NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.05 DEFINITIONS

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

- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.06 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.07 PRE-DEMOLITION CONFERENCE

- A. Pre-Demolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.08 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Schedule: Submit for approval selective demolition schedule, including schedule and methods for capping utilities to be abandoned and maintaining existing utility service.
- C. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Inventory: Submit a list of items to be removed by the Contractor and salvaged for re-use prior to start of demolition.
- F. Pre-demolition Photographs or Video: Submit before Work begins.
- G. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.
- H. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.09 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.1. Minimum of 5 years of documented experience.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.10 SEQUENCING

A. Portion of building immediately adjacent to selective demolition area may be occupied during construction.

- B. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.11 HAZARDOUS MATERIALS

- A. Hazardous Materials: Hazardous materials are not thought to be present in buildings where selective demolition is occurring.
 - 1. An Asbestos Report is available from the Owner upon request. If there are questions they may be directed to the Owner.
 - a. The Contractors shall examine the report to become aware of locations where hazardous materials are present.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials.
- B. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.
- C. Hazardous materials will be removed by Owner, under a separate contract, prior to the start of the Work.
- D. SPEC NOTE:Retain subparagraph below if hazardous materials are known to be present. Delete if Owner does not have, or will not provide, material safety data sheets for these materials.
 - 1. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
 - a. An Asbestos Report is available from the Owner upon request. If there are questions they may be directed to the Owner.
 - 2. The Contractor shall be fully and solely responsible for work involving lead-bearing materials.

1.12 EXISTING WARRANTIES

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Record documents of existing construction may be provided by Owner. There is no guarantee that existing conditions are same as those indicated in record documents.
 - 1. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings and pre-construction photographs.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified herein.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified herein.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.03 SELECTIVE DEMOLITION - GENERAL

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
- B. Occupied Spaces: Do not close or obstruct streets, walks, drives or other occupied or used spaces or facilities without the written permission of the Owner and the authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission of the Owner and authorities having jurisdiction. If necessary, provide temporary utilities.
- C. Operations: Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued properly.
- D. Demolish and remove existing construction only to the extent required by new construction and as indicated on the Drawings. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.

- Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
- 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
- 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
- 5. Maintain adequate ventilation when using cutting torches.
- 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
- 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- 8. Dispose of demolished items and materials promptly. Remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- E. Existing Items to Remain (ETR): Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition, then reinstalled in their original locations after selective demolition operations are complete.
- F. Hazardous Materials: 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.
- G. Security: Provide adequate protection against accidental trespassing. Secure project after work hours.
- H. Restoration: Restore finishes of patched areas.

3.04 SALVAGE ITEMS

- A. Items to be Salvaged for Delivery to Owner:
 - 1. Requirements:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until delivery to Owner.
 - d. Transport items to Owner's storage area designated by Owner.
 - e. Protect items from damage during transport and storage.
 - 2. Owner-salvaged items may include:
 - a. Doors and hardware.
 - b. Toilet accessories.
 - c. Light fixtures.
 - d. Plumbing fixtures.
 - e. Decorative elements.
- B. Items to be Salvaged for Reinstallation:
 - 1. Requirements:
 - a. Clean and repair items to functional condition adequate for intended reuse.
 - b. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - c. Protect items from damage during transport and storage.
 - d. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
 - 2. Items to be salvaged and reinstalled may include:
 - a. Doors and hardware.
 - b. Toilet accessories.

- c. Light fixtures.
- d. Plumbing fixtures.
- e. Decorative elements.
- f. Furniture, fixtures, and equipment.

3.05 SELECTIVE DEMOLITION - EXISTING UTILITIES & SERVICES

- A. Utilities Requiring Interruption, Capping, or Removal:
 - 1. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
 - a. Protect existing utilities to remain from damage.
 - b. Do not disrupt public utilities without permit from authority having jurisdiction.
 - 2. Do not close, shut off, or disrupt existing life safety systems that are in use without prior written notification to Owner.
 - 3. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without prior written notification to Owner.
 - 4. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- B. Services: Remove existing systems and equipment as indicated.
 - 1. Services include, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications):
 - a. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - b. 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.
 - c. Verify that abandoned services serve only abandoned facilities before removal.
 - 2. 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.
 - 3. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- C. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.06 DEBRIS AND WASTE REMOVAL

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them. Use of an EPA-approved landfill shall be required if materials include such items that require that type of landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Provide Landfill Receipts indicating proper disposal of all hazardous materials disposed of by the Contractor.
- B. Burning: Do not burn demolished materials on-site.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

3.07 CLEANING

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

3.08 SCHEDULE OF ITEMS TO BE SALVAGED FOR REINSTALLATION

A. Coordinate with Architect prior to the starting of the selective demolition Work.

3.09 SCHEDULE OF ITEMS TO BE SALVAGED AND DELIVERED TO OWNER

A. Coordinate with Owner prior to the starting of the selective demolition Work.

END OF SECTION

SECTION 03 05 05

UNDERSLAB VAPOR BARRIER

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Sheet vapor barrier under concrete slabs-on-grade.

1.03 RELATED SECTIONS

Section 03 30 00 - Cast-in-Place Concrete

1.04 REFERENCES

- A. ASTM E1643 Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.
- B. ASTM E1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.05 SUBMITTALS

- A. Refer to Section 01 33 00 Submittal Procedures for requirements.
- B. Product Data: Submit manufacturers' data on manufactured products.
- C. Test Data: Submit report of tests showing compliance with specified requirements.
- D. Samples: Submit samples of underslab vapor barrier to be used.
- E. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Stego Industries, LLC (P: (877) 464-7834 / Email: contact@stegoindustries.com / Web: www.stegoindustries.com)
 - 1. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - a. Fortifiber Corporation: Moistop Ultra.
 - b. Raven Industries Inc.: Vapor Block.
 - c. Poly-America, LP: Husky Yellow Guard.
 - d. Insulation Solutions, Inc.: Viper Vaporcheck.

2.02 MATERIALS

- A. Product: Stego® Wrap Vapor Barrier.
 - 1. Performance Criteria:
 - a. Water Vapor Permeance: Not more than 0.010 perms (0.6 ng/(s m2 Pa)) (maximum) when tested in accordance with ASTM E1745, Class A.
 - b. Strength: ASTM E1745, Class A.
 - c. Thickness: 15 mils (0.4 mm) minimum.
 - d. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745, Section 8.1.

2.03 ACCESSORIES

- A. Seams:
 - 1. Stego Tape
- B. Sealing Penetrations of Vapor barrier:
 - 1. Stego Mastic.
 - 2. Stego Tape.

- C. Perimeter/Edge seal:
 - 1. Stego Crete Claw.
 - 2. Stego Term Bar.
 - 3. StegoTack Tape (double-sided sealant tape).
- D. Penetration Prevention:
 - 1. Beast Foot.
- E. Vapor Barrier-Safe Screed System
 - 1. Beast Screed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.
- B. Install vapor barrier under interior slabs on grade.
- C. Install vapor barrier on top of the granular fill.
- D. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
- E. Extend vapor barrier to the perimeter of the slab. Terminate it at the top of the slab.
- F. Lap joints minimum 6 inches (150 mm).
- G. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.
- H. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.
- I. Repair damaged vapor retarder before covering with other materials.

END OF SECTION
SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
 - 2. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with fly ash, subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, forms and form removal limitations, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer manufacturer testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Floor and slab treatments.
 - 6. Bonding agents.
 - 7. Adhesives.
 - 8. Vapor retarders.
 - 9. Semirigid joint filler.
 - 10. Joint-filler strips.
 - 11. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates.
- E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
 - 1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
- F. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- G. Field quality-control reports.
- H. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

1.8 **PRECONSTRUCTION TESTING**

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

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

1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301 (ACI 301M).
 - 2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated, and edge sealed.
 - c. Structural 1, B-B or better; mill oiled, and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled, and edge sealed.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- C. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- D. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
- D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I/II gray.
 - 2. Fly Ash: ASTM C 618, Class F.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
- F. Water: ASTM C 94/C 94M and potable.

2.6 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.7 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.8 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 according to ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

- 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings and Foundation Walls: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 - 2. Maximum W/C Ratio: 0.45.
 - 3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 - 4. Air Content: 6 percent, plus or minus 1.0 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
- B. Slabs-on-Grade: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 - 2. Maximum W/C Ratio: 0.45.
 - 3. Minimum Cementitious Materials Content: 470 lb/cu. yd. (279 kg/cu. m).
 - 4. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 - 5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.12 FABRICATING REINFORCEMENT

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

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

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

3.4 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

3.5 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.8 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low

spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

- 1. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces indicated.
 - 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - 3. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm).

3.10 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 - 5. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 6. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

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- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moistureretaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than three days' old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 - 6. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and

apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 5. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - 7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratorycured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 - 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 - 9. Strength of each concrete mixture will be satisfactory if every average of any threeconsecutive compressive-strength tests equals or exceeds specified compressive

strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

- 10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- 12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
- 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 03 30 30

CONCRETE WORK - PATCHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Furnishing of all necessary materials, labor and equipment, mixing, placing and furnishing of all plain and reinforced concrete for patching of existing concrete floor slabs for Work indicated on the drawings.

1.03 RELATED SECTIONS

Section 02 41 00 - Selective Demolition

1.04 REFERENCES

- A. Comply with the requirements of the following codes, specifications, and standards. When the provisions of this section differ from the referenced codes, specifications, and standards the provisions of this section shall govern. Comply with local building code requirements that are more stringent than those specified herein.
- B. ACI 302 "Recommended Practice for Concrete Floor and Slab Construction
- C. ACI 304 "Recommended Practice for Measuring, Mixing, and Placing Concrete"
- D. CRSI "Manual of Standard Practice"
- E. ASTM C33/C33M "Standard Specification for Concrete Aggregates"
- F. ASTM C94/C94M "Standard Specification for Ready-Mixed Concrete"
- G. ASTM C150/C150M "Standard Specification for Portland Cement"
- H. ASTM A1064/A1064M "Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete"

1.05 SUBMITTALS

- A. Concrete Mix Designs: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 Concrete Mixtures.
 - 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 Concrete Quality, Mixing and Placing.
- B. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and accessories.
 - 3. Waterstops.
 - 4. Joint-filler strips.
- C.
- D. Test Reports
- E. See individual paragraphs this section for requirements.

1.06 QUALITY ASSURANCE

- A. Contractor shall be qualified/experienced in concrete patching of this type.
- B. Comply with governing codes and regulations.

1.07 CONCRETE TESTING

A. Not required.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Portland Cement: Conforming to ASTM C150/C150M, Type I or III.
- B. Aggregates: Shall conform to the standard specifications for concrete aggregates (ASTM C33/C33M) with all subsequent amendments thereto.
 - 1. Coarse Aggregate: Clean, hard, durable, uncoated, crushed limestone conforming to the quality and gradation requirements of ASTM C33/C33M. Maximum size aggregate allowed shall be 3/4" for construction less than 6" in thickness.
 - a. Coarse Aggregate for lightweight concrete shall conform to ASTM C330/C330M.
 - 2. Fine Aggregate: Shall conform to ASTM C33/C33M.
- C. Water: Shall be clean and free from deleterious substances, oils, acids, alkalis, or organic materials.
- D. Admixtures: Not required.

2.02 GRANULAR FILL

- A. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve placed <u>below</u> the vapor retarder.
 - 1. Install and compact at 4 inches minimum depth, unless otherwise indicated on the Drawings.

2.03 JOINTING PRODUCTS

- A. Slab Expansion and Isolation Joint Filler Strips: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.

2.04 REINFORCING

- A. All bars shall be billet steel conforming to ASTM A615/A615M, grade 60 steel for #5 bars and greater and grade 40 steel for #4 and under.
- B. Reinforcing Accessories;
 - 1. Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, cut bars true to length with ends square and free of burrs.
 - 2. Bar Supports: Bolsters, spacers, chairs, ties, and other devices necessary for properly placing, spacing, supporting and fastening reinforcement in place shall be used according to the latest edition of the Concrete Reinforcing Steel Institute Manual.

PART 3 EXECUTION

3.01 CONCRETE QUALITY

- A. The Contractor shall guarantee concrete with the following minimums
 - 1. Cast-in-place structural concrete shall be 3,500 psi design strength using not less than 500 pounds of cement per cubic yard and not more than 6 gallons of water per 100 pounds of cement with aggregate specified.
- B. Normal Weight Concrete
 - 1. Shall be used throughout the project (structural and non-structural).
 - 2. Prior to placing any concrete, the Contractor shall submit for review by the Architect a mix design for each type of concrete proposed for use by each concrete supplier, substantiated by a laboratory report attesting to the concrete properties, including compressive strength and splitting strength.
 - 3. Upon approval, the Contractor shall not change suppliers except upon written authorization by the Architect.
- C. Mixing Concrete

- 1. The concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.
- 2. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94/C94M with all subsequent amendments thereto.
- 3. Maximum Slump: 4".
- D. Placing Concrete
 - 1. Placement shall be planned well in advance so that all sections of a particular area may be poured in one continuous operation.
 - 2. Before Concrete is placed, all debris and foreign material shall be removed from the area to be poured. All reinforcing and any special metal parts or shapes shall be properly set into position.
 - 3. Transporting: Concrete shall be handled from carts, buggies, or wheelbarrows. Every possible precaution shall be taken to prevent separation or loss of the ingredients while transporting the concrete.
 - 4. Placing: Troughs, Pipes and Chutes
 - a. Concrete shall not be dropped freely a distance of more than five (5) feet.
 - b. Placing of any given section shall be done in a continuous operation.
- E. Extra water shall not be added to the concrete mix at the job site.
- F. Placing Time:
 - 1. The elapsed time between proportioning of materials, including cement, and placing of concrete in its final position shall never exceed 90 minutes.
 - 2. Concrete shall never remain on the job site for more than 60 minutes without being placed.

3.02 BENDING AND PLACING REINFORCING STEEL

- A. Cleaning and Bending Reinforcement:
 - 1. Metal reinforcement, at the time concrete is placed shall be free from rust, scale or other coatings that will destroy or reduce the bond.
 - 2. Bends for other bars shall be made around a pin having a diameter of not less than six times the minimum thickness of the bar except that for bars larger than 1 inch, the pin shall be not less than eight times the minimum thickness of the bar.
 - 3. All bars shall be bent cold.
- B. Placing Reinforcement:
 - 1. Metal reinforcement shall be accurately placed in accordance with the Drawings and shall be adequately secured in position by concrete or metal chairs and spacers.

3.03 FINISHING

- A. Flatwork slabs shall be poured monolithic, leveled with a straight edge screed in a sawing motion of a strike-off board.
 - 1. Finish to match existing/adjacent concrete surfaces.
 - 2. Interior slabs, shall be floated and finished with steel trowel.
 - 3. Floating shall not start until water sheen has disappeared or concrete has stiffened enough to prevent excess fine material working to the surface.

3.04 TOLERANCES:

A. Allowable tolerance from level or grade shall be 1/4" in 10 feet measured with a straight edge in any direction.

END OF SECTION

SECTION 04 22 00 CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
- B. Products Installed but not Furnished under This Section:
 - 1. Cast-stone trim in concrete unit masonry.
- C. Related Requirements:
 - 1. Section 071900 "Water Repellents" for water repellents applied to unit masonry assemblies.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 **PREINSTALLATION MEETINGS**

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties and material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - 2. Integral water repellant used in CMUs.
 - 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 - 4. Mortar admixtures.
 - 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 6. Grout mixes. Include description of type and proportions of ingredients.
 - 7. Reinforcing bars.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

- Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
- 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

- 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
 - 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
 - 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
- C. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
 - 2. Density Classification: Lightweight.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.

4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for coldweather construction. Provide natural color or white cement as required to produce mortar color indicated.
 - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91/C 91M.
- E. Mortar Cement: ASTM C 1329/C 1329M.
- F. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
- G. Aggregate for Grout: ASTM C 404.
- H. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
- I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- J. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
- K. Water: Potable.

2.6 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.
 - 1. Interior Walls: Hot-dip galvanized carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
 - 5. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.
 - 6. Provide in lengths of not less than 10 feet (3 m).

2.7 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into masonry but with at least a 5/8-inch (16-mm) cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

- 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
- 2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
- 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized steel.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
- B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For masonry below grade or in contact with earth, use Type S.
 - 2. For reinforced masonry, use Type S.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
 - 3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.
- E. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.
 - 1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
 - 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).
- C. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
 - 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
 - 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).

4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 - 2. Wet joint surfaces thoroughly before applying mortar.
 - 3. Rake out mortar joints for pointing with sealant.
- D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
- B. Provide continuity at corners by using prefabricated L-shaped units.
- C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

- 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
- 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.8 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Testing Prior to Construction: One set of tests.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- H. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.9 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

- 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
- 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
- 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.10 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soilcontaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
 - 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
 - 3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 12 00 STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Grout.

B. Related Requirements:

- 1. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
- 2. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting".

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment Drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
 - 1. Power source (constant current or constant voltage).
 - 2. Electrode manufacturer and trade name, for demand critical welds.

D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 3. Shop primers.
 - 4. Nonshrink grout.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.

- 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
- 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Allowable Stress Design; data are given at service-load level.

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing (Fy = 46 ksi).
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
 - 1. Weight Class: Standard.
 - 2. Finish: Black.
- F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavyhex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
- C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain.
- D. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- E. Threaded Rods: ASTM A 36/A 36M.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.

- 2. Washers: ASTM A 36/A 36M carbon steel.
- 3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

2.4 PRIMER

- A. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- C. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.5 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."
- F. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches (250 mm) o.c. unless otherwise indicated.
- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
 - 6. Surfaces enclosed in interior construction.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.

- D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 **PREPARATION**

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.

- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

- 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION

SECTION 05 31 00 STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof deck.
- B. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
 - 2. Section 099123 "Interior Painting" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
 - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
 - 2. Acoustical roof deck.
- D. Evaluation Reports: For steel deck, from ICC-ES.
- E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- C. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS
2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 (230) minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 - 2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating.
 - 3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 (Z180) zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 - 4. Deck Profile: Type WR, wide rib.
 - 5. Profile Depth: 1-1/2 inches (38 mm).
 - 6. Design Uncoated-Steel Thickness: As indicated.
 - 7. Span Condition: Triple span or more.
 - 8. Side Laps: Overlapped.

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbonsteel screws, No. 10 (4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.
- G. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and level recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.
- H. Galvanizing Repair Paint: ASTM A 780/A 780M with dry film containing a minimum of 94 percent zinc dust by weight.
- I. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated.
 - 1. Weld Diameter: 5/8 inch (16 mm), nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck as noted on construction documents.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 12 inches (305 mm), and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbonsteel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
 - 1. End Joints: Lapped 2 inches (51 mm) minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches (305 mm) apart with at least one fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.

- 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Prepare test and inspection reports.

3.5 **PROTECTION**

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint.
 - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

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

1.03 RELATED SECTIONS

- A. Section 06 10 00 Rough Carpentry
- B. Section 06 16 00 Glass-Mat Gypsum Sheathing
- C. Section 07 21 00 Thermal Insulation
- D. Section 07 25 00 Weather Barriers
- E. Section 07 27 26 Fluid-Applied Vapor-Permeable Membrane Air Barriers
- F. Section 07 92 00 Joint Sealants.
- G. Section 09 21 16 Gypsum Board Assemblies

1.04 REFERENCES

- A. AISI S100-12 North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A1003/A1003M Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 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; 2015.
- D. ASTM C1007 Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a (Reapproved 2015).
- E. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.
- F. AWS D1.1/D1.1M Structural Welding Code Steel; 2015 (with March 2016 Errata).
- G. AWS D1.3/D1.3M Structural Welding Code Sheet Steel; 2008.

1.05 SUBMITTALS

- A. See Section 01 33 00 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, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Indicate stud and ceiling joist layout.
 - 2. Describe method for securing studs to tracks and for bolted framing connections.
 - 3. Delegated Design Submittal:
 - a. Submit structural calculations prepared by manufacturer for approval. Submittal shall be sealed by a professional engineer registered in the state of Missouri.
 - b. Design Criteria:
 - 1) Engineering analysis depicting stress and deflection (stiffness) requirements for each framing application.

- 2) Selection of framing components, accessories and welded connection requirements.
- 3) Verification of attachments to structure and adjacent framing components.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Missouri.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.
- D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3/D1.3M, "Structural Welding Code--Sheet Steel."
 - 1. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."
- E. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by GA File Numbers in GA-600, "Fire Resistance Design Manual," or by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - 2. AISI Specifications: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing:

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Protect and store materials protected from exposure to rain, snow or other harmful weather conditions. Products to be handled per AISI S202 "Code of Standard Practice for Cold-Formed Steel Structural Framing."

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Products from <u>ClarkDietrich</u> are specified to establish a standard of quality for design, function, materials, and appearance.
- B. Other Manufacturers: The following manufacturers are approved to provide materials or products that are equivalent to the "Basis of Design":
 - 1. CEMCO
 - 2. Jaimes Industries
 - 3. Marino Ware
 - 4. R-stud, LLC
 - 5. SCAFCO Corporation
 - 6. Steel Construction Systems
 - 7. The Steel Network, Inc
 - 8. United Products, Inc.
 - 9. Substitutions: See Section 01 25 00 Substitution Procedures.
- C. Framing Connectors and Accessories:
 - 1. Same manufacturer as metal framing.

2.02 FRAMING SYSTEM - DESIGN DATA

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Design Requirements: Provide completed framing system having the following characteristics:
 - 1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100-12.
 - 2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
 - 3. Design Loads: Includes live and dead loads on floor and roofs, snow loads, and wind loads:
 - a. In accordance with applicable codes.
 - b. As indicated on the structural drawings, Sheet S1.00.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Gage and Depth: As required to meet specified performance levels.

2.04 MATERIALS

- A. Cold-Formed Steel Sheet: Complying with ASTM A1003/A1003M; unless indicated otherwise.
- B. Protective Coating: CP60 coating designator minimum (G60, A60, AZ50, GF30), complying with ASTM C955 and AISI S240.
 - 1. Where required: CP90 coating designator minimum (G90, AZ50, GF45), complying with ASTM C955 and AISI S240.

2.05 FRAMING SYSTEM - COMPONENTS

- A. Structural Studs
 - 1. Basis of Design: ClarkDietrich; "Cold-Formed Steel C-Studs".
 - 2. Gage and Web Depth: As required to meet specified performance levels.
 - 3. Minimum Yield Strength: As required for design.
- B. Structural Track: Cold-formed steel track
 - 1. Basis of Design: ClarkDietrich; "Cold-Formed Steel Track".
 - 2. Web Depth: Match stud web size.
 - 3. Minimum Yield Strength: As required for design.
 - 4. Material Thickness (Gage): Match stud/joist thickness unless design dictates heavier thickness.
- C. Slotted Deflection Track
 - 1. Basis of Design: ClarkDietrich; "MaxTrak (SLT), MaxTrak 2D (SLT/H), or BlazeFrame DSL".
 - 2. Gage and Web Depth: As required to meet specified performance levels.
 - 3. Minimum Yield Strength: As required for design.
 - 4. Slotted or un-slotted.
- D. Deflection and Drift Clips
 - 1. Material Thickness: As required for design, based on application.
- E. Clip Angles (Support Clips)
 - 1. Basis of Design: ClarkDietrich; "EasyClip Series".
 - 2. Size and Material Thickness: As required for design, based on application.
- F. U-Channel
 - 1. Basis of Design: ClarkDietrich; "U-Channel and FastBridge Clip".
 - 2. Size and Material Thickness: As required for design.
- G. Furring Channel
 - 1. Basis of Design: ClarkDietrich; "Furring Channel".

- 2. Size and Material Thickness: As required for design.
- H. Bridging/Spacer Bar
 - 1. Basis of Design: ClarkDietrich; "TradeReady Spazzer 5400 Bridging and Spacing Bar".
 - 2. Material Thickness: As required for design.
- I. Web Stiffeners
 - 1. Basis of Design: ClarkDietrich; "EasyClip Quick Twist Web Stiffener".
 - 2. Size and Material Thickness: As required for design.
- J. Load-Bearing Headers
 - 1. Basis of Design: ClarkDietrich; "Heavy Duty Stud (HDS) or Header Bracket (HDSC), cold-formed galvanized one-piece load-bearing header.
 - 2. Size and Material Thickness: As required for design.
- K. Partial Height Wall Framing
 - 1. Basis of Design: ClarkDietrich; "Pony Wall (PW)"
 - 2. Material Thickness: 12 gauge, 0.0966 inch (2.45mm).
 - 3. Size: As required for design.
- L. Framing Component Accessories: Provide the following accessories as required for a complete system.
 - 1. Flat strapping.
 - 2. Angles, plates, sheets.
 - 3. Custom brake-formed shapes.
- M. Fasteners: Self-drilling, self-tapping screws; Steel, complying with <u>ASTM C 1513</u>; Galvanized coating, plated or oil-phosphate coated complying with <u>ASTM B 633</u> as needed for required corrosion resistance.
- N. Touch-Up Paint: Complying with <u>ASTM A 780</u> Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings. Zinc rich, containing 95-percent metallic zinc.

2.06 FABRICATION

- A. General: Framing components may be pre-assembled into panels prior to erecting.
- B. Fabricate panels square, with components attached in a manner so as to prevent racking or distortion.
- C. Cut all framing components squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Hold members positively in place until properly fastened.
- D. Provide insulation as specified elsewhere in all double jamb studs and double header members, which will not be accessible to the insulation Subcontractor.
- E. Axially Loaded Studs:
 - 1. Install studs to have full bearing against inside track web (1/8 inches (3.2 mm) maximum gap) prior to stud and track attachment.
 - 2. Splices in axially loaded studs are not permitted.
- F. Fasteners: Fasten components using self-tapping screws or welding.
- G. Welding: Welding is permitted on 18 gauge or heavier material only.
 - 1. Specify welding configuration and size on the Structural Calculation submittal.
 - 2. Qualify welding operators in accordance with Section 6.0 of AWS D.1.3.
 - 3. Touch up all welds with zinc-rich paint in compliance with <u>ASTM A 780</u>.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installation, inspect previous work of all other trades. Verify that all work is complete and accurate to the point where this installation may properly proceed in strict accordance with framing shop drawings.

3.02 ERECTION

- A. General Requirements:
 - 1. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
 - 2. Weld in compliance with AWS D.1.3.
 - 3. Install in compliance with applicable sections of the AISI S240 "North American Standard for Cold-Formed Steel Structural Framing."
- B. Wall Systems:
 - 1. Erect framing and panels plumb, level and square in strict accordance with approved shop drawings.
 - 2. Handle and lift prefabricated panels in a manner so as not to cause distortion in any member.
 - 3. Anchor track securely to the supporting structure as shown on the erection drawings. Install concrete anchors only after full compressive strength has been achieved. Provide a sill sealer or gasket barrier between all concrete and steel connections.
 - 4. Butt all track joints. Securely anchor abutting pieces of track to a common structural element, or butt-weld or splice them together.
 - 5. Align and plumb studs, and securely attach to the flanges or webs of both upper and lower tracks except when vertical movement is specified.
 - 6. Install jack studs or cripples below window sills, above window and door heads, at freestanding stair rails and elsewhere to furnish support, securely attached to supporting members.
 - 7. Attach wall stud bridging in a manner to prevent stud rotation. Space bridging rows according to manufacturer's recommendations.
 - 8. Frame wall openings to include headers and supporting studs as shown in the drawings.
 - 9. Provide temporary bracing until erection is completed.
 - 10. Provide stud walls at locations indicated on plans as "shear walls" for frame stability and lateral load resistance.
 - 11. Where indicated in the drawings, provide for structural vertical movement using a vertical slide clip or other means in accordance with manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

- A. Inspection: Periodic special inspections are required by local code authorities.
 - 1. Owner will hire and pay inspection agency.
 - 2. Submit schedule showing when the following activities will be performed and resubmit schedule when timing changes.
 - 3. Inspections are required during welding operations, screw attachment, bolting, anchoring and other fastening of components within the force resisting structural system, including struts, braces, and hold-downs.

3.04 PROTECTION

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

SECTION 05 43 00

SLOTTED CHANNEL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

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

1.03 RELATED SECTIONS

A. Section 09 22 16 - Non-Structural Metal Framing.

1.04 REFERENCES

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

- 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. <u>ASTM A907</u> Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled, Structural Quality
- D. 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; 2015.
- E. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- F. <u>ASTM F1136</u> Standard Specification for Chromium/Zinc Corrosion Protective Coatings for Fasteners
- G. AWS D1.1/D1.1M Structural Welding Code Steel; 2015 (with March 2016 Errata).
- H. SSPC-Paint 15 Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.05 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.

1.06 SUBMITTALS

- A. Submit drawings of strut and accessories including clamps, brackets, hanger rods, and fittings.
- B. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties including Section Modulus (Sx) and Moment of Inertia (Ix).

1.07 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. 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.

- D. Delegated-Design Submittal: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Missouri.
 - 1. Structural calculations by a Registered Structural Engineer may include, but are not limited to:
 - a. Description of design criteria
 - b. Stress and deflection analysis
 - c. Selection of framing members, fittings, and accessories

1.08 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.

1.09 WARRANTY

- A. The installation shall be warranted to be free of defects in material and workmanship for a period of one (1) year from Date of Substantial Completion.
- B. The manufacturer shall warrant the product against material defects, or defects in manufacturing, for one (1) year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Specified Manufacturer: Unistrut Corporation.
 - 1. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - a. Haydon Corporation
 - b. Cooper B-Line, Inc.
 - c. Hilti, Inc.
 - d. Flex-Strut, Inc.

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 pipe grid system.

2.03 MATERIALS

- A. Slotted Channel Framing:
 - 1. Cold-formed metal box channels (struts) complying with MFMA-4.
 - 2. Materials and Finish:
 - a. Pre-Galvanized Steel: Strut shall be made from steel meeting the minimum mechanical properties of ASTM A653/A653M SS, Grade 33, and mill galvanized in accordance with coating designation G90. Fittings shall be manufactured from steel meeting the minimum requirements of <u>ASTM A907</u> SS, Grade 33. All fittings and hardware shall be zinc plated in accordance with ASTM B633 (SC3 for fittings, SC1 for threaded hardware).

2.04 ACCESSORIES

- A. Plates, Gussets, Clips: 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.

2.05 FASTENERS

- A. Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Welding: In conformance with AWS D1.1/D1.1M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 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.

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes: Provide metal fabrications, miscellaneous metal, and related accessory items, galvanized and prime painted, complete, as shown and specified. The work includes, but is not limited to, the following:
 - 1. Steel framing and supports for operable partitions, overhead doors, coiling shutters, etc.
 - 2. Steel framing and supports for mechanical and electrical equipment.
 - 3. Steel railings, guardrails, handrails, brackets, and sockets.
 - 4. Steel ladders.
 - 5. Elevator hoist way door sill angles, sump grates, and frames.
 - 6. Metal floor plate or grating.
 - 7. Loose steel lintels.
 - 8. Steel Bollards.
 - 9. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 10. Miscellaneous steel framing, supporting angles, plates, brackets, clips, anchors and bolts for equipment, and other work which is not specifically included in Section 05 12 00, but which is required to complete the Project.

1.03 RELATED SECTIONS:

- A. Section 03 30 00 Cast-in-Place Concrete.
- B. Section 04 20 00 Unit Masonry.
- C. Section 05 12 00 Structural Steel Framing.
- D. Section 05 43 00 Slotted Channel Framing.
- E. Section 05 51 00 Metal Stairs.
- F. Section 05 73 13 Decorative Metal Railings.
- G. Section 07 72 00 Roof Accessories.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's literature including product characteristics, accessories and limitations.
- B. Selection Samples: Submit samples of colors and finishes if requested by architect.
- C. Verification Samples: Submit samples of selected materials specified to verify color and finish.
- D. Industry Certifications and Standards: Submit copy of documentation indicating compliance.
- E. Test and Evaluation Reports: Submit reports showing compliance with specified performance characteristics and physical properties.
- F. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."

- 2. AWS D1.2/D1.2M, "Structural Welding Code Aluminum."
- 3. AWS D1.6, "Structural Welding Code Stainless Steel."

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 PRODUCTS

2.01 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.02 FERROUS METALS

- A. Steel Sections: ASTM A992, hot-dip galvanized for exterior use.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, Type S, Grade B, Schedule 40, unless otherwise indicated.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
 - 2. Material: Cold-rolled steel, ASTM A 1008/A 1008M, structural steel, Grade 33 (Grade 230); 0.0677-inch (1.7-mm) minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.
- F. Stainless Steel: Steel: ASTM A240 for plate or sheet, A269 for tubing and A312 for pipe.
 - 1. Interior Use: Type 304, 18-8 grade, USS gauge, #4 finish.
 - 2. Exterior Use: Type 316L, 18-8 grade, USS gauge, #4 finish.

2.03 NON-FERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

2.04 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- G. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

- J. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
- K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- L. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- M. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.05 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.06 MANUFACTURED UNITS

- A. Handrail Brackets: Provide Julius Blum & Co. Inc. No. 385, Blumcraft of Pittsburgh, or equal, cast malleable iron wall bracket.
 - 1. Provide metal bracket filler (spacer) between base of bracket and stud where bracket is mounted against gypsum board wall.
 - 2. Provide [galvanized][powder coated] finish for exterior applications.
- B. Trench Drain: Heavy duty cast iron trench frame and grated cover, for 200mm wide trenches, 6mm slot width top with cast iron support angle frame, and galvanized steel-form pan. Provide Neenah Foundry "Model R4990-AX with Trench Type P", McKinley "Model TGMB-8", or equal.
- C. Tread Nosings: Nosings at concrete treads shall be Wooster Type WP2C, Balco, or equal. Color shall be contrasting to the concrete step color and shall be as selected by the Architect.

2.07 FABRICATION - GENERAL

- A. Verify dimensions on site prior to shop fabrication. Coordinate metalwork with adjoining work for details of attachment and fit. Be responsible for fabrication detailing and correct fitting of steel members to each other and to their supports.
- B. Use materials of size and thickness shown or, if not shown, of size and thickness to produce strength and durability in the finished product for the utility intended.
- C. Fabricate items with joints tightly fitted and secured. Make exposed joints butt tight, flush, and hairline.
- D. Grind exposed welds flush and smooth with adjacent finished surface. Ease exposed edges to small uniform radius.
- E. Fit and shop assemble in largest practical sections, for delivery to site and handling through building openings.

F. Provide components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.

2.08 WELDING

- A. All surfaces shall be clean, free of rust, paint, and foreign matter of any kind. Burned edges to be welded shall be chipped clean and wire brushed before welding. Clamp members as required, space and alternate welds, as may be necessary to prevent warping or misalignment.
- B. Weld Metal: Weld metal shall be thoroughly fused with the base metal along surfaces and edges of the union. Penetration shall be 1/8 inch (4 mm) minimum and shall be into the root of the joint.
- C. Weld Quality: Welds shall present a uniform surface, free of imperfections, without undercutting or overlapping, and free from excessive oxides, gas pockets, and nonmetallic inclusions. Welds shall be made with the proper number of beads or passes to secure sound, thoroughly fused joints. Provide backup bars, temporary backup bars, or backup welds for full-penetration butt welds. Each deposit shall not exceed 1/2 inch (12 mm) of weld for each pass of bead. Preceding layers shall be cleaned by wire brushing or preening to remove scale and slag before placing new weld material.
- D. Faulty and Defective Welding: Welding showing cracks, slag inclusion, lack of fusion, bad undercut, or other defects ascertained by visual or other means of inspection, shall be chipped out and properly replaced.

2.09 RAILS

- A. Form rails and posts from steel pipe and shapes as shown on Drawings, with welded jointing. Fabricate right-angle and 45 degree bends of rail with 3 inches (75 mm) radius to center line of pipe without flattening the rail member noticeably.
- B. Coordinate with the work of Section 05 51 00.
- C. For fittings, elbows, wall brackets, and escutcheons provide machined steel. Provide splice connectors of steel as shown.
- D. Provide return at free ends of handrails to 1 inch (25 mm) from face of wall. Provide end cap for free ends of tube handrails and railings. Weld joints, end caps, returns, and transitions. Grind smooth and make flush.
- E. Provide extension for handrails and railings at edges of stairs and ramp to comply with the applicable building code, and ADA regulations.
- F. Provide mounting brackets and flanges, for secure anchorage of handrails and railings.
- G. Fabricate guardrails to comply with the specified loading requirements.

2.10 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.11 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime miscellaneous steel trim with zinc-rich primer.

2.12 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe.
- B. Prime bollards with zinc-rich primer.

2.13 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.14 STEEL WELD PLATES AND ANGLES

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

2.15 STEEL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3 unless otherwise indicated.
 - 2. For elevator pit ladders, comply with ASME A17.1.
- B. Steel Elevator Pit Ladder:
 - 1. Space siderails of elevator pit ladders 12 inches (300 mm) apart.
 - 2. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm) steel flat bars, with eased edges.
 - 3. Rungs: 3/4-inch- (19-mm-) diameter steel bars.
 - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - 5. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
 - 6. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets.
 - 7. Prime ladders, including brackets and fasteners, with zinc-rich primer.
- C. Aluminum Ladders: Refer to Section 07 72 00.

2.16 FINISH - STEEL

- A. Cleaning: Thoroughly clean mill scale, rust, dirt, grease, and other foreign matter from ferrous metal prior to galvanizing, powder coating or painting.
 - 1. Remove scale, rust, and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-6, "Commercial Blast Cleaning."
- B. Shop Priming: Shop-paint metal work except members or portions of members to be embedded in concrete, surfaces and edges to be field welded, and galvanized surfaces.
 - 1. Immediately after surface preparation, brush or spray on primer in accordance with the paint manufacturer's instructions. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.
 - 2. Apply one shop coat to metal items, except apply two coats to surfaces inaccessible after assembly or erection. Change color of the second coat to distinguish it from the first.
- C. Galvanizing: Provide a zinc coating for exposed exterior items (unless specified to be powder coated) and items to be embedded in concrete, complying with the following:
 - 1. For galvanizing iron and steel hardware, ASTM A153.
 - 2. For galvanizing rolled, pressed, and forged steel shapes, plates, bars, and strips 3mm thick and heavier, ASTM A123.

2.17 FINISH - ALUMINUM

A. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine the substrate and conditions in which the work is to be installed. Correct unsatisfactory substrate and conditions prior to start of installation.

3.02 PREPARATION

- A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts, and miscellaneous items having integral anchor, which are to be embedded in concrete construction. Coordinate delivery of such items to project site.
- B. Coordinate metalwork with adjoining work. Do cutting, shearing, drilling, punching, threading, tapping, etc., required for metal work and for attachment of adjacent work. Drill or punch holes; do not use cutting torch. Shearing and punching shall leave true lines and surfaces.
- C. Obtain Architect-Engineer's review prior to site cutting or making adjustments to structural members not indicated to be cut or adjusted.
- D. Clean and strip primed steel items to bare metal where site welding is to be done.
- E. Make provision for erection loads with temporary bracing. Keep work in alignment.

3.03 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners for securing metal work to in-place construction, including threaded fasteners for concrete inserts, through bolts, lag bolts, screws, and other connectors as required.
 - 1. Conceal fastenings where practical. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Form joints exposed to weather to exclude water.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of metal work. Set work accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels. Provide temporary bracing anchors in formwork for items which are to be built into concrete or similar construction.
 - 1. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch up shop paint coat. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
- C. Field Welding: Comply with AWS D1.1 for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.
- D. Corrosion Protection: Protect dissimilar metals from galvanic corrosion by pressure tapes, coating, or isolators as acceptable to Architect-Engineer.
- E. Grouting: Do grouting of frames, plates, sills, bolts, and similar items with nonshrink grout.
- F. Alignment: Verify alignment of items with adjacent construction. Coordinate related work.
- G. Handrails: Secure steel handrails with bracket. Unless otherwise noted, locate brackets 6 inches (150 mm) from ends of handrail, 6 feet (1.8 m) on center maximum, and space brackets equidistant at each handrail. Where bracket is fastened to stud wall, provide steel plate backing securely fastened to studs; toggle bolt secured to gypsum wallboard is not acceptable.

3.04 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

SECTION 05 51 33 METAL LADDERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Interior metal ladders for roof hatch access.
- B. Ladder accessories.

1.03 RELATED SECTIONS

A. Section 07 72 00 - Roof Accessories

1.04 REFERENCES

- A. ANSI A14.3 American National Standard for Ladders -- Fixed -- Safety Requirements; 1992.
- B. OSHA 29 CFR Standard 1910.28 Fixed ladders; Occupational Safety and Health Standards; current edition

1.05 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: Detailed drawings showing complete dimensions, all materials, mounting attachments, and fabrication details.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in the engineering and manufacturing of metal ladders, with a record of successful in-service performance.
- B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.
- C. Product Qualification: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurement before fabrication.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

1.08 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.09 WARRANTY

A. The manufacturer shall warrant the product/s to be free of defects in material and workmanship for a period of five (5) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Precision Ladders, LLC
 - 1. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be accepted. Additional manufacturers will be considered in accordance with the "or equal" provision specified in Section 01 60 00 Product Requirements.

- a. O'Keeffe's, Inc.
- b. Precision Ladders, LLC.
- c. Royalite Manufacturing, Inc.
- d. UPNOVR, Inc.
- B. Substitutions: Submit a request for substitution for any manufacturer not named, as specified in Section 01 25 00 Substitution Procedures.

2.02 MATERIALS

- A. Extruded Aluminum Profiles: ASTM B221, Alloy 6061-T6; standard mill finish.
- B. Aluminum Sheet and Plate: ASTM B209/ASTM B209M, Alloy 6061-T6; standard mill finish.
- C. Fasteners: Aluminum solid aircraft rivets rated at 300 lbs (1335 N) shear strength.
- D. Cast fittings, connectors and rung ends: Cast Aluminum alloy 356

2.03 FINISH

A. Mill finish. As extruded.

2.04 ACCESSORIES

PART 3 EXECUTION

3.01 EXAMINATION

- A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.
- B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.
- C. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.02 PREPARATION

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

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, and in compliance with ANSI A14.3 and OSHA 1910.28.

3.04 PROTECTION

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

SECTION 05 52 13

PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Free-standing railings at steps.

1.03 RELATED SECTIONS

- A. Section 03 30 00 Cast-in-Place Concrete: Placement of anchors in concrete.
- B. Section 09 91 13 Exterior Painting: Paint finish.

1.04 REFERENCES

- A. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- B. ASTM A500/A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- C. ASTM E935 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.
- D. ASTM E985 Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- E. AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- F. SSPC-Paint 15 Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

1.05 SUBMITTALS

- A. Submit in accordance with Section 01 33 00 Submittal Procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Delegated Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.06 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.
- B. Templates: Supply installation templates, reinforcing and required anchorage devices.
- C. Single Source Responsibility: Obtain handrails from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.6/D1.6M, "Structural Welding Code Stainless Steel."
- E. Fabricator Qualifications:
 - 1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in factory provided protective coverings and packaging.
- B. Protect materials against damage during transit, delivery, storage, and installation at site.

- C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
- D. Prior to installation, store materials and components under cover, in a dry location.

1.08 WARRANTY

- A. Warranty: Manufacturer's standard warranty against defects in materials, fabrication, finishes, and installation during the warranty period.
 - 1. Warranty Period: One (1) year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 DESIGN / PERFORMANCE REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot (1095 N/m) applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
- C. Concentrated Loads: Design handrails and attachments to resist a concentrated force of 200 pounds (890 N) applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches (38 mm) diameter, round.
 - 2. Intermediate Rails: 1-1/2 inches (38 mm) diameter, round.
 - 3. Posts: 1-1/2 inches (38 mm) diameter, round.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.

2.02 STEEL RAILING SYSTEM

- A. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.
- B. Steel Pipe: ASTM A53/A53M, Grade B Schedule 80, black finish.
- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- D. Exposed Fasteners: No exposed bolts or screws.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.

3. 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.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Anchor railings securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. This section specifies wood blocking, wood nailers, rough hardware, and wood backing.
- B. Preservative treatment of lumber and plywood materials.
 - 1. Blocking or furring in exterior walls.
- C. Fire-retardant treatment of lumber and plywood materials.

1.03 RELATED SECTIONS

- A. Section 09 21 16 Gypsum Board Assemblies
- B. Section 09 22 16 Non-Structural Metal Framing

1.04 REFERENCES

- A. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- B. ASTM C954 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- C. ASTM D2898 Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010.
- D. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- E. <u>ASTM D5664</u> Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
- F. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- G. AWPA U1 Use Category System: User Specification for Treated Wood; 2016.
- H. PS 1 Structural Plywood; 2009.
- I. PS 20 American Softwood Lumber Standard; 2015.

1.05 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures.
- B. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for lumber, panels, hardware and adhesives.
 - 2. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 3. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - a. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to <u>ASTM D 5664</u>.

- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- D. Fire-Retardant Treatment Certification: Treating plant's certification of compliance with specified requirements.
- E. Preservative Treatment Certification: Treating plant's certification of compliance with specified standards, process employed, and preservative retention values.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- C. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.07 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. Exposure: Prevent wood products against moisture and dimensional changes, in accordance with instructions from treating plant.

1.08 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard 50-year limited warranty for pressure-treated FRTW, lumber and plywood.
- B. Manufacturer's Warranty: Provide manufacturer's standard lifetime limited warranty for pressure treated lumber and plywood.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Fire-Retardant Treatment of Lumber and Plywood:
 - 1. Specified Manufacturer: Viance, LLC..
 - a. Contacts: P: 800-421-8661 / Web: www.treatedwood.com
 - 2. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be accepted. Additional manufacturers will be considered in accordance with the "or equal" provision specified in Section 01 60 00 Product Requirements.
 - a. Flameproof Companies
 - b. Fire Retardant Chemical Technology (FRCT).
 - c. Arch Wood Protection, Inc.
 - d. Hoover Treated Wood Products, Inc.
 - e. Koppers, Inc.
 - f. LP Building Products
 - 3. Substitutions: Submit a request for substitution for any manufacturer not named, as specified in Section 01 25 00 Substitution Procedures.
- B. Preservative Treatment of Lumber and Plywood:
 - 1. Specified Manufacturer: Viance, LLC.
 - a. Contacts: P: 800-421-8661 / Web: www.treatedwood.com
 - 2. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be accepted. Additional manufacturers will be considered in accordance with the "or equal" provision specified in Section 01 60 00 Product Requirements.
 - a. Arch Wood Protection, Inc .
 - b. Koppers Performance Chemicals, Inc.

3. Substitutions: Submit a request for substitution for any manufacturer not named, as specified in Section 01 25 00 - Substitution Procedures.

2.02 WOOD PRODUCTS - GENERAL

- A. Regional Materials: Dimension lumber, except treated materials, shall be manufactured within 500 miles (800 km) of Project site.
- B. Lumber Grade Stamps: Each piece of lumber must bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.
- C. Lumber Grading Agency: Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
- D. Lumber:
 - 1. Comply with DOC PS 20.
 - 2. Species: Douglas Fir, unless otherwise indicated.
 - a. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
 - 3. Lumber Surfacing: S4S.
 - 4. Maximum Moisture Content of Lumber:
 - a. 19-percent for 2-inch nominal (38-mm) thickness or less.
 - b. 25-percent for more than 2-inch nominal (38-mm) thickness.
- E. Plywood shall be Group 1 Species meeting requirements of U.S. Product Standard PS-1, of sizes and thicknesses indicated or required. Each panel shall carry the APA grade trademark.
 - 1. Species: Fir.
 - 2. Thickness: 5/8 inch, minimum.
 - 3. Plywood shall be Exterior Grade or manufactured with Exterior Glue, with C-C or C-D (plugged) faces.
 - 4. Fire-Retardant Treatment: Plywood shall be fire-retardant treated in accordance with <u>AWPA C27</u> to have a flame spread rating of less than 25 when tested in accordance with ASTM E84
 - 5. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.

2.03 WOOD NAILERS, BACKING, AND BLOCKING

- A. Provide continuous wood nailers, backing, and blocking in metal stud framed walls as required to support finishes, fixtures, specialty items, and trim, unless those items can be securely fastened to two or more studs or other method of support is explicitly indicated.
 - 1. Blocking shall include, but not be limited to, the following:
 - a. Around door and window openings for anchorage of frames.
 - b. Base and/or wall cabinets.
 - c. Countertop support brackets.
 - d. Shelf supports.
 - e. Handrails.
 - f. Wall paneling and trim.
 - g. Toilet accessories (grab bars, mirrors, etc.).
 - h. Hardware items (door stops, etc.).
 - i. Markerboards and tackboards.
 - j. Audio/Visual equipment.
 - k. Other equipment as indicated on the drawings.
- B. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- C. Dimensional Lumber for Wood Nailers, Backing, and Blocking:
 - 1. Species: Douglas Fir.
 - 2. Surfacing: S4S.
 - 3. Grade:

- a. 4 inches and narrower: No. 1 or Construction Grade.
- b. 6 inches and wider: No. 2 or Standard Grade.
- D. Fire-Retardant Treatment: Refer to "Fire-Retardant Pressure Treatment of Lumber and Plywood" Article this Section.
- E. Anchors and Fasteners:
 - 1. Anchor to metal decking with self-drilling, self- tapping, tempered steel screws manufactured for the purpose of securing items to metal decking.
 - 2. Secure to metal framing for gypsum board walls and partitions with self-drilling, self-tapping tempered steel drywall screws of type and size required for the installation.

2.04 PLYWOOD BACKING PANELS

- A. Type: PS 1, A-C plywood, or medium density fiberboard; 3/4 inch (19 mm) thick.
- B. Fire-Retardant Treatment (if applicable): Plywood shall be fire-retardant treated in accordance with AWPA C27 to have a flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- C. Applications:
 - 1. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
- D. Anchors and Fasteners:
 - 1. Anchor to metal decking with self-drilling, self- tapping, tempered steel screws manufactured for the purpose of securing items to metal decking.
 - 2. Secure to metal framing for gypsum board walls and partitions with self-drilling, self-tapping tempered steel drywall screws of type and size required for the installation.

2.05 HARDWARE

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Fasteners and Metal Hardware: Provide corrosion resistant steel fasteners with Hot-dip zinc coating per ASTM A153/A153M, provide corrosion resistant hardware per ASTM A653 / A653M Class G-185 in compliance with building code requirements.
- C. Screws for Fastening to Metal Framing: ASTM C1002 or ASTM C954, length as recommended by screw manufacturer for material being fastened.

2.06 FIRE-RETARDANT PRESSURE TREATMENT OF LUMBER AND PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Product: D-Blaze FRT, as manufactured by Viance, LLC.
- C. Physical Properties:
 - 1. Surface Burning Characteristics: Capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84.
- D. Treatment shall not promote corrosion of metal fasteners.
- E. Lumber: Comply with AWPA U1, Category UCFA, Type A, or ICC-ES ESR 2645.
- F. Plywood: Comply with AWPA U1, Use Category UCFA, Type A, or ICC-ES ESR 2645.
- G. All interior rough carpentry items are to be fire-retardant treated.
- H. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
- I. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- J. Treated wood members that must be cut in the field shall be dipped, after cutting, in the same fire-retardant chemical that was used in the pressure treating process.

2.07 PRESERVATIVE-TYPE PRESSURE TREATMENT OF LUMBER AND PLYWOOD

- A. Product: ACQ, as manufactured by Viance, LLC.
- B. Exposed lumber and plywood to receive preservative-type pressure treatment shall be pressure treated using Ammoniacal Copper Quaternary compound (ACQ).
 - 1. Preservative shall penetrate a minimum of 3/8-inch (9.5 mm) deep into wood.
- C. Preservative Treatment for Above Ground Use: AWPA U1, Use Category UC3B, as appropriate.
- D. Preservative Treatment for Ground and Fresh Water Contact: AWPA U1, Use Category UC4A, as appropriate.
- E. Preservative Treatment for Contact with Soil: AWPA U1, Category UC4A, as appropriate.
- F. Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

PART 3 EXECUTION

3.01 PREPARATION

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

3.03 INSTALLATION - TREATED WOOD MATERIALS

- A. Fire-Retardant Treated Wood:
 - 1. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.
 - 2. End cuts and drilling are permitted. Do not rip or mill lumber after fire-retardant treatment.
- B. Preservative Treated Wood:
 - 1. Surface treatment of field cuts: All field cuts on members that provide structural support to a permanent structure shall be field treated in accordance with AWPA M4.

3.04 INSTALLATION - WOOD NAILERS, BACKING, AND BLOCKING

- A. Fireblocking: In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code.
 - 1. Other material acceptable to code authorities may be used in lieu of solid wood blocking.
- B. Provide continuous wood nailers, backing, and blocking in metal stud framed walls as required to support finishes, fixtures, specialty items, and trim, unless those items can be securely fastened to two or more studs or other method of support is explicitly indicated.

3.05 INSTALLATION - PLYWOOD BACKING PANELS

- A. Plywood Backing Panels: 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. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 2. Install adjacent boards without gaps.
 - 3. Size and Location: As indicated on drawings.

3.06 WASTE DISPOSAL

A. Comply with applicable regulations.

SECTION 06 16 00

GLASS-MAT GYPSUM SHEATHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Glass mat gypsum sheathing.

1.03 RELATED SECTIONS

- A. Section 05 40 00 Cold-Formed Metal Framing
- B. Section 06 10 00 Rough Carpentry
- C. Section 07 27 26 Fluid-Applied Vapor-Permeable Membrane Air Barriers
- D. Section 09 22 16 Non-Structural Metal Framing

1.04 REFERENCES

- A. <u>ASTM D 5516</u> Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.
- B. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.06 DELIVERY, STORAGE, AND HANDLING

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

1.07 WARRANTY

- A. The manufacturer shall warrant the product against delamination and deterioration for exposure to normal weather conditions for a period of one (1) year from Date of Substantial Completion.
- B. The manufacturer shall warrant the product against defects in manufacturing, for a period five (5) years from Date of Substantial Completion.
- C. The manufacturer shall warrant the product against defects in manufacturing when sheathing used as substrate for EIFS, for a period of twelve (12) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Specified Manufacturer: Georgia-Pacific (G-P) Gypsum .
 - 1. Contacts: P: 800-225-6119 / Web: www.buildgp.com
- B. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - 1. <u>CertainTeed Corporation; GlasRoc</u>.
 - 2. National Gypsum Company; Gold Bond e(2)XP.
 - 3. <u>Temple-Inland Inc.; GreenGlass</u>
 - United States Gypsum Co.; Securock.

2.02 GLASS MAT GYPSUM WALL SHEATHING

- A. Product: DensGlass® Sheathing
 - 1. Glass-Mat Gypsum Wall Sheathing: ASTM C1177/C1177M, Type X.
 - 2. Thickness: 1/2-inch.

- 3. Installation: Screw to cold-formed metal framing.
- 4. Width (nom.): 48-inches.
- 5. Length: 8-, 9-, or 10-feet.
- 6. Weight: 1.9 lbs/sf.
- 7. R-Value: 0.56.
- 8. Physical Properties:
 - a. Compressive Strength: 500 psi (3445 kPa), minimum.
 - b. Permeance: > 23 perms.
 - c. Combustability: Product is noncombustible as described and tested in accordance with ASTM E136.
 - d. Surface Burning Characteristics: Flame spread rating: 0; smoke develop rating: 0, when tested in accordance with ASTM E84.
 - e. Air Barrier Compliance: Per the International Energy Conservation Code® (IECC), gypsum sheathing shall comply with the prescriptive code language for use as a continuous air barrier when the joints and openings are properly sealed.

2.03 FASTENERS

- A. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, according to ASTM B117
 - 1. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C1002.
 - 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C954.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
 - 3. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- E. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.
- F. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- G. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

- H. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
- I. Seal sheathing joints according to sheathing manufacturer's written instructions.

3.02 PROTECTION

- A. Protect glass mat-surfaced gypsum sheathing that will be exposed to weather for more than 180 days by covering exposed exterior surface of sheathing with a securely fastened air-infiltration barrier. Apply covering immediately after sheathing is installed. Maximum exposure of assembly is 270 days prior to covering with exterior wall covering.
- B. Protect cutouts, corners, and joints in sheathing by filling with a flexible sealant or by applying tape recommended by sheathing manufacturer at time sheathing is applied.

SECTION 06 61 16

SOLID SURFACE FABRICATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Solid surface countertops.
- B. Integral sink bowls.

1.03 RELATED SECTIONS

- A. Section 06 10 00 Rough Carpentry
- B. Section 09 21 16 Gypsum Board Assemblies
- C. Section 12 32 16 Manufactured Plastic Laminate Faced Casework

1.04 REFERENCES

- A. ASTM C384 Standard Test Method for Impedance and Absorption of Acoustical Materials by Impedance Tube Method; 04.
- B. ASTM E228 Standard Test Method for Linear Thermal Expansion of Solid Materials With a Push-Rod Dilatometer; 17.
- C. ASTM E84

1.05 SUBMITTALS

- A. Product data: Indicate product description, fabrication information and compliance with specified performance requirements.
- B. Shop Drawings: Indicate dimensions component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- C. Samples:
 - 1. Submit product data indicating compliance with specification requirements.
 - 2. Samples: Submit 2-inch by 2-inch samples
- D. Maintenance data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close out documents.

1.06 QUALITY ASSURANCE

A. Accessible Design: Comply with [the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation. Store indoors.
- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.08 WARRANTY

A. The manufacturer shall warrant the product/s to be free of defects in material and workmanship for a period of ten (10) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Specified Manufacturer: Refer to Interior Finish Legend, Sheet A4.2.
 - 1. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.

2.02 SOLID SURFACING FABRICATIONS

- A. Solid Surfacing Fabrications, scheduled on the Drawings as Finish Type SSF- #.
 - 1. Refer to the "Interior Finish Legend" (Sheet A4.2) for the pertinent information on this Finish Type.
- B. Physical Properties:
 - 1. Flammability: Class A, when tested to ASTM E84
 - a. Flame Spread Index: Less than 25.
 - b. Smoke Development Index: Less than 450.
 - 2. Food Equipment Material Compliance: Food Zone to NSF 51
 - 3. Tensile Strength: 6000 psi minimum, per ASTM D638
 - 4. Tensile Modulus: 1.35 x 10(6) psi minimum, per ASTM D638.SOLID
 - 5. Tensile Elongation: 0.5% minimum, per ASTM D638.
 - 6. Flexural Strength: 10000 psi minimum, per ASTM D790
 - 7. Flexural Modulus: 1.34 x 10(6) psi minimum, per ASTM D790.
 - 8. Hardness: >85-Rockwell "M" scale minimum, per ASTM D785
 - 9. Thermal Expansion: 1.8 x 10(5) in./in./°F, per ASTM E228
 - 10. Fungi and Bacteria: Does not support microbial growth, per ASTM G21
 - 11. Microbial Resistance: Highly resistant to mold growth, per UL 2824
 - 12. Ball Impact: No fracture 1/2 lb. Ball: NEMA LD 3
- C. Design Load: Deflection limited to 1/360.
- D. Design items with sufficient strength for handling stresses.

2.03 MATERIALS

- A. Solid Surfacing Material:
 - 1. Composition: Homogeneous-filled plastic resin complying with ISSFA-2.
 - a. Material Thickness: 1/2-inch.
 - b. Panel Weight: Per manufacturer.
 - c. Colors and Pattern: As scheduled.
 - d. Finish: As scheduled.
- B. Integral Sinks: Refer to "Solid Surface Sinks" Article this Section.
- C. Adhesives and Sealant: Refer to "Installation Accessories" Article this Section.

2.04 COUNTERTOPS

- A. Countertops shall be built-up with 1/2-inch thick solid surface sheet over a 1-inch thick sub-top, for a total thickness of 1-1/2 inches.
 - 1. Sub-Top Material: MDF and/or MR-MDF.
- B. Construction:
 - 1. Depth: As indicated on the Drawings.Countertops requiring compliance with ADA shall have a maximum depth of 24-inches (600-mm) from the farthest most projection of cabinetry to the face of back wall.
 - a. ADA Compliant Countertops shall have a maximum depth of 24-inches (600-mm), measured from the farthest most projection of cabinetry to the face of back wall.
 - 2. Edge Thickness: 1-1/2 inches.
 - 3. Edge Profile: Eased edge.
 - 4. Overhang: 1-inch (25-mm) beyond face of base cabinets.
 - 5. Open End Radii: Countertops with open ends shall have a 1 1/2-inch radius at the open end between the front and end faces.
 - 6. Transaction Tops: Same as countertops.
- C. Splashes (Back- and End-)
 - 1. Height: 4-inches high, typical.
 - 2. Thickness: 1/2-inch (12-mm).
 - 3. Splash Type/s:

- a. Shop-formed integral splashes with coved assembly between horizontal and vertical surfaces.
 - 1) Coved strip assembly shall be recessed into the deck 3-mm to eliminate 'feather' at glue line.
 - 2) Provide a formed scribe strip at top of splash to permit scribing to wall surface.
 - 3) L-Shaped Returns: Shop-fabricated inside corner cove.
- b. Field-Applied Backsplashes: Provide loose fabrications to be field set, unless noted otherwise.
 - 1) Backsplashes and returns are attached to countertop with silicone adhesive.
- D. Material and Color: Refer to the Interior Finish Legend (Sheet A4.2).

2.05 INSTALLATION MATERIALS

- A. Mounting Adhesive: Provide structural-grade silicone or epoxy adhesives as recommended by manufacturer for application and per conditions of use.
 - 1. Provide spacers, if required, of type recommended by adhesive manufacturer.
- B. Joint Adhesive: Methacrylate-based adhesive for chemically bonding solid surfacing seams. Color complementary to solid surfacing sheet material. <u>UL 2818</u> GREENGUARD Gold certified and complying with SCAQMD Rule 1168.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
- C. Elastomeric Joint Sealant (Silicone): Mildew-resistant silicone sealant for filling gaps between countertops and terminating substrates in wet environment applications. Complies with ASTM C920, Type S (single component), Grade NS (nonsag).
 - 1. Color: Complementary to solid surfacing color.
- D. Siliconized Acrylic Joint Sealant: Siliconized acrylic latex sealant. For general applications to fill gaps between countertops and at terminating substrates. Complies with ASTM C384, Type OP, Grade NF, and SCAQMD Rule 1168.
 - 1. Color: Complementary to quartz surfacing color.
- E. Construction Adhesive: Countertop manufacturer's recommended silicone-based construction adhesive for backsplashes, endsplashes, and other applications according to manufacturer's published fabrication instructions.
- F. Solvent: Product recommended by adhesive manufacturer to clean surface of solid surfacing to assure adhesion of adhesives and sealants.
- G. Cleaning Agents: Non-abrasive, low pH cleansers.

2.06 FABRICATION

- A. Assemble work at shop following manufacturer's printed fabrication instructions and deliver to job ready for installation. Manufacture in largest practical pieces for handling and shipping without seams.
 - 1. Grade: AWI, Premium.
 - 2. Fabricate tops with shop-applied edges, backsplashes, and endsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 3. Joints: Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints.
 - 4. Cut and finish component edges with clean sharp returns. Route radius and contours to template. Repair or reject defective and inaccurate work.
 - 5. Do not exceed manufacturer's recommended unsupported overhang distances.
 - 6. Integral Sinks: Refer to "Solid Surface Sinks" Article this Section.
 - 7. Provide cut-outs for plumbing fixtures and trim, washroom accessories, appliances, and related items. Confirm layout with manufacturer's cut-out templates before beginning work. Round corners of cut-outs and sand edges smooth.
 - 8. Recess and conceal fasteners, connections, and reinforcing.
 - 9. Radius corners and edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine walls and other surrounding construction prior to installation of solid surface fabrications.
 - 1. Verify that construction complies with indicated requirements of construction documents regarding size, configuration and other requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install components plumb and level, scribed to adjacent finishes, in accordance with approved shop drawings and product installation details.
- B. Fabricate field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints as specified herein. Cut and finish component edges with clean, sharp returns.
- C. Install countertops with no more than 1/8" sag, bow or other variation from a straight line.
- D. Seal between wall and components with joint sealant.

3.03 REPAIRS

A. Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer's "Technical Bulletins".

3.04 SITE QUALITY CONTROL

A. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Architect at no cost to Owner.

3.05 CLEANING

- A. Remove excess adhesive and sealant from visible surfaces.
- B. Clean surfaces in accordance with manufacturer's "Care and Maintenance Instructions".

3.06 PROTECTION

- A. DO NOT stand on the installed countertops for any reason.
- B. Provide protective coverings to prevent physical damage or staining following installation for duration of Project.
- C. Protect surfaces from damage until Date of Substantial Completion.

SECTION 06 82 00

RIGID SHEET WALL PROTECTION PANELS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Non-PVC rigid sheet for wall protection and decoration.

1.03 RELATED SECTIONS

- A. Section 07 92 00 Joint Sealants
- B. Section 09 21 16 Gypsum Board Assemblies

1.04 PERFORMANCE REQUIREMENTS:

- A. Rigid Vinyl:
 - 1. Fire Rating: NFPA, Class A.
 - 2. Surface Burning Characteristics per UL-723 (ASTM E84):
 - a. Flame Spread: 20 (max.)
 - b. Smoke Developed: 350 (max.)
 - 3. Self-Extinguishing Classification (ASTM D635) : CC1.
 - 4. Impact Strength (ASTM D256): 30.4 ft-lbs/ inch of thickness.
 - 5. Chemical and Stain Resistance: Provide material that shows resistance to stain when tested in accordance with applicable provisions of ASTM D543.
 - 6. Fungal and Bacterial Resistance: Provide material that does not support fungal or bacterial growth as tested in accordance with ASTM G-21 and ASTM G-22.
 - 7. GREENGUARD Certified: Provide GREENGUARD Certified sheet. Sheet shall meet the requirements of GREENGUARD Certification Standards for Low-Emitting Products and GREENGUARD Product Emission Standard for Children & Schools.

1.05 SUBMITTALS

- A. See Section 01 33 00 for submittal procedures.
- B. Product Data: Submit manufacturer's literature including product characteristics, accessories and limitations.
- C. Selection Samples: Submit samples of colors and finishes if requested by architect.
- D. Verification Samples: Submit samples of selected materials specified to verify color and finish.
- E. Industry Certifications and Standards: Submit copy of documentation indicating compliance.
- F. Test and Evaluation Reports: Submit reports showing compliance with specified performance characteristics and physical properties.
- G. Maintenance Data: Include instructions for stain removal, surface and gloss restoration.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer regularly engaged, for a minimum of 5-years, in the manufacturing of rigid wall protection panels of similar type to that specified.
- B. Installer's Qualifications:
 - 1. Installer regularly engaged, for a minimum of 5-years, in installation of rigid wall protection panels of similar type to that specified.
 - 2. Employ persons trained for installation of panels.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
1.08 FIELD CONDITIONS

- A. Do not install site fabricated components when site conditions may be detrimental to successful installation.
- B. Maintain temperature and humidity conditions favorable to proper curing of resin during and after installation.

1.09 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty against defects in manufacturing for one (1) year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN

- A. Basis-of-Design Manufacturer / Products: Subject to compliance with the Contract Documents, provide product/s from the manufacturer's specified; No exceptions.
 1. Substitutions will not be considered for the materials and products specified in this Section.
- B. Basis-of-Design Manufacturer: Products from InPro Corporation are specified to establish a standard of quality for design, function, materials, and appearance.
- C. Single Source: Provide FRP panels and accessories from single manufacturer.

2.02 RIGID SHEET WALL PROTECTION PANELS

- A. Wall Protection Panels, scheduled on the Drawings as Finish Type 'WP- #'.
 - 1. Refer to the "Interior Finish Legend" (Sheet A4.2) for pertinent information on this Finish Type.
- B. Type WP-1:
 - 1. Basis of Design:
 - a. Manufacturer: Inpro Corporation.
 - b. Product: Palladium® Rigid Vinyl Sheet Wall Protection.
 - c. Substitutions: Not permitted.
 - 2. Product Specification:
 - a. Material: Rigid Vinyl Sheet: Manufactured from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added.
 - b. Thickness: 0.040 inches.
 - c. Panel Width: 36-inches or 48-inches.
 - d. Panel Length: 96-inches.
 - e. Surface Texture: Velvet Texture.
 - f. Color: As scheduled.
 - g. Fire Rating: Class A.
 - h. Adhesive: As recommended by manufacturer.

2.03 MATERIALS

A. Rigid Vinyl Sheet: Shall be manufactured from chemical and stain resistant polyvinyl chloride with the addition of impact modifiers. No plasticizers shall be added.

2.04 ACCESSORIES

- A. Trim Accessory Pieces:
 - 1. Vinyl Trim: Color matched dividers, outside corners, inside corners, or top caps as required.
- B. Caulk: Color Matched Caulk

PART 3 EXECUTION

3.01 EXAMINATION

- A. Complete all finishing operations, including painting, before beginning installation of wall protection panels.
- B. Wall surfaces shall be dry and free from dirt, grease and loose paint.
- © ACI / Boland, Inc.

3.02 INSTALLATION

- A. Install fabrications in accordance with shop drawings and manufacturer's instructions.
- B. Install panels with bottom edge located to clear top of wall base.
- C. Apply adhesive uniformly using adhesive manufacturers recommended trowel to the entire back of panels completely to the edge (100% coverage).
- D. Lay FRP panels in place leaving approximately 1/8 inch between panels and 1/4 inch space top and bottom.
- E. Follow adhesive manufacturer's recommendations for set and application times.
- F. Apply pressure to entire panel face with laminate type roller, removing trapped air and ensure proper adhesion between surfaces.

3.03 CLEANING

A. Clean fabrications in accordance with manufacturer's instructions.

3.04 PROTECTION

A. Place protective structural covering over installed units until the completion of the Project.

END OF SECTION

SECTION 07 13 26

SELF-ADHERING SHEET WATERPROOFING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Installation of sheet membrane waterproofing on surfaces indicated on drawings, consisting of preparation of surfaces, sealing of cracks and joints, and application of Sheet Membrane Waterproofing.
 - 1. Self-adhered modified bituminous sheet membrane waterproofing.

1.03 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete

1.04 ABBREVIATIONS

- A. EPDM Ethylene Propylene Diene Monomer.
- B. HDPE High-Density Polyethylene.
- C. PVC Polyvinyl Chloride.
- D. SBS Styrene-Butadiene-Styrene.
- E. TPO Thermoplastic Polyolefin.

1.05 REFERENCES

- A. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2016.
- B. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2015a).
- 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 (Reapproved 2015).
- G. ASTM D1970/D1970M Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2015a.
- 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; 2016.
- 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).

1.06 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures
- B. Product Data: Submit manufacturer's product literature and installation instructions.
- C. Subcontractor's approval by Manufacturer: Submit document stating manufacturer's acceptance of subcontractor as an Approved Applicator for the specified materials.
- D. Warranty: Submit a sample warranty identifying the terms and conditions of the Work.
- E. Certificates: Certify that products meet or exceed specified requirements.

1.07 QUALITY ASSURANCE

- A. Applicator Qualifications: Applicator shall have 5 years of experience in applying the same or similar materials and shall be specifically approved in writing by the membrane manufacturer.
- B. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).
- C. Pre-Application Conference: Prior to beginning work, convene a conference to review conditions, installation procedures, schedules and coordination with other work.

1.08 MOCK-UP

- A. Construct mock-up consisting of 100 sq ft (10 sq m) of horizontal waterproofed panel; to represent finished work including internal and external corners.
- B. Mock-up may remain as part of this Work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact.
- B. Store materials in protected and well ventilated area. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with local applicable regulations.

1.10 FIELD CONDITIONS

- A. Do not apply membrane when surface temperature is below or inclement weather conditions conflict with manufacturer's published requirements.
- B. Coordinate waterproofing work with other trades. The applicator shall have sole right of access to the specified areas for the time needed to complete the installation.
- C. Warn personnel against breathing of vapors and contact of material with skin or eyes. Wear applicable protective clothing and respiratory protection gear.
- D. Keep flammable products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.
- E. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

1.11 WARRANTY

A. The manufacturer shall warrant the product/s to be free of defects in material and workmanship for a period of five (5) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Carlisle Coatings and Waterproofing Inc. (CCW)
 - 1. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be accepted. Additional manufacturers will be considered in accordance with the "or equal" provision specified in Section 01 60 00 Product Requirements.
 - a. American Hydrotech, Inc.
 - b. W.R. Grace & Co.
 - c. Henry Company
 - d. W.R. Meadows Inc.
 - e. Polyguard Products, Inc.
- B. Substitutions: Submit a request for substitution for any manufacturer not named, as specified in Section 01 25 00 Substitution Procedures.
- C. Single Source: Provide sheet waterproofing and accessories from single manufacturer.

2.02 SHEET MEMBRANE WATERPROOFING

A. Self-Adhesive Sheet Membrane Waterproofing:

- B. Product: CCW; "MiraDRI 860/861".
- C. Description: Consists of 56-mils of rubberized asphalt membrane laminated to a 4-mil thick cross-laminated polyethylene film.
- D. Thickness: 60 mil (0.060 inch) (1.5 mm), <u>ASTM D3767</u>.
 - 1. Self-adhering sheet.
- E. Sheet Width: Per manufacturer.
- F. Physical Properties:
 - 1. Tensile Strength:
 - a. Film: 5000 pounds per square inch (34.57 MPa), minimum, measured according to ASTM D882.
 - b. Membrane: 325 pounds per square inch (____ MPa), minimum, measured according to ASTM D412.
 - 2. Elongation: 350 percent, minimum, measured according to ASTM D412.
 - 3. Permeance: 0.05 perm (2.9 ng/(Pa s sq m)), maximum, measured in accordance with ASTM E96/E96M.
 - 4. 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.
 - 5. Peel Strength: 10.0 pounds per inch (_____N/m), minimum, when tested according to ASTM D903.
 - 6. Lap Adhesion: 19.0 pounds per inch (____ N/m), minimum, when tested according to ASTM D1876.
 - 7. Puncture Resistance: 60 lbf, minimum, measured in accordance with ASTM E154/E154M.
 - 8. Water Absorption: 0.1 percent increase in weight, maximum, measured in accordance with ASTM D570.
 - 9. Hydrostatic Head: Resists the weight of 230 feet (_____ m) when tested according to ASTM D5385/D5385M.
 - 10. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.

2.03 PROTECTION COURSE

- A. Product: 1. Vert
 - Vertical Surfaces: CCW; "Protection Board-V".
 - a. Expanded polystyrene board insulation, ASTM C578.
 - b. Thickness: 1/4-inches (90 mils).

2.04 DRAINAGE COMPOSITE

- A. Product: CCW; "MiraDRAIN 6000XL/6200XL".
- B. Composition: Drainage Composite is made up of a durable, nonwoven filter fabric that is bonded to the individual dimples of a molded polystyrene core.
 - 1. The filter fabric prevents the passage of soil particles into the core while allowing subgrade moisture to pass freely.

2.05 PERIMETER DRAINAGE SYSTEM

- A. Product: CCW; "MiraDRAIN HC".
- B. High-Capacity, Molded-Sheet Collector-Panel System: Composite subsurface collector-panel system by same manufacturer as primary molded-sheet drainage panels; consisting of a high-profile, studded, nonbiodegradable, molded-plastic-sheet drainage core; with a woven-geotextile facing with an apparent opening size not exceeding No. 40 sieve laminated to one side of the core; and with a vertical flow rate of 9 to 17 gpm per ft. and a horizontal flow rate. Provide system with manufacturer's outlets, connectors, tapes, and other accessories to connect primary molded-sheet drainage panels with piped subdrainage system.

PART 3 EXECUTION

3.01 INSPECTION

A. Before any waterproofing work is started the waterproofing applicator shall thoroughly examine all surfaces for any deficiencies or unsatisfactory conditions detrimental to the proper completion of the work. Should any deficiencies exist, the architect, owner, or general contractor shall be notified in writing. Do not proceed with work until all deficiencies or unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
- B. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing.
- C. Cast-In-Place Concrete Substrates:
 - 1. Do not proceed with installation until concrete has properly cured and dried (minimum 7 days for normal structural concrete and minimum 14 days for lightweight structural concrete).
 - 2. Concrete shall be cured by water curing method. Any curing compounds must be of the pure sodium silicate type or clear resin-based materials without waxes, oils or pigments and be approved by the Carlisle representative.
 - 3. Form release agents must not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane.
 - 4. Concrete shall be sloped for proper drainage.
 - 5. Voids, rock pockets and excessively rough surfaces shall be repaired with approved nonshrink grout or ground to match the unrepaired areas. Fill form tie rod holes with concrete and finish flush with surrounding surface.
 - 6. Two-stage drains shall have a minimum 3 inch flange and be installed with the flange flush and level with the concrete surface.
 - 7. Surfaces at cold joints shall be on the same plane. Grind irregular construction joints to suitable flush surface.
- D. Related Materials: Treat joints and install flashing as recommended by waterproofing manufacturer.

3.03 INSTALLATION

- A. Waterproofing Membrane:
 - 1. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.
 - 2. Apply primer/contact adhesive at rate recommended by manufacturer. Recoat areas which were not waterproofed the same day or if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of primer.
 - a. Do not install membrane until primer/contact adhesive is completely dry. Dry time will vary with weather conditions.
 - 3. Apply and firmly adhere membrane sheets over area to receive waterproofing. Accurately align sheets and maintain uniform lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - When ambient and substrate temperatures range between 25 and 40 deg F install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
 - b. Seal installation at the end of the day with troweled bead of CCW-LM-800XL or CCW-703V Liquiseal.

- 4. Immediately install protection course with butted joints over waterproofing membrane.
- B. Protection Board:
 - 1. Install Protection Board according to manufacturer's written instructions.
 - 2. Place protection board directly against membrane; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.
 - 3. Adhere protection board to substrate with compatible adhesive.
 - 4. Install protection board before installing drainage panels on vertical applications.
- C. Drainage Panel System
 - 1. Vertical Applications: Install Drainage Panel according to manufacturer's written instructions.
 - a. Lap edges and ends of geotextile to maintain continuity.
 - b. Use adhesives or other methods that do not penetrate waterproofing.
 - c. Backfill should be placed as soon as possible. Backfill to at least 6" (15 cm) above the top edge of the MiraDRAIN.
- D. Perimeter Drainage System:
 - 1. Install as the first course of drainage composite immediately after membrane has been installed on vertical surfaces.
 - a. Install at the base of the wall with the bottom edge flush with top of footing.
 - 2. Place and secure collector-panel system and tie into molded-sheet drainage panels. Secure using adhesives or other methods that do not penetrate waterproofing.
 - 3. Lap edges and ends of geotextile to maintain continuity.
 - 4. Install collector and connector items to permit tie-in with underground storm drainage system. Refer to civil drawings.

3.04 PROTECTION

- A. Protect installed board insulation and drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Rigid foam board insulation, EPS and XPS.
- B. Acoustical blanket insulation.
- C. Fiberglass batt insulation.
- D. Mineral wool insulation.
- E. Perimeter containment systems.
- F. Fire safing insulation.

1.03 RELATED SECTIONS

- A. Section 06 10 00 Rough Carpentry
- B. Section 06 16 00 Glass Mat Gypsum Sheathing
- C. Section 06 16 10 Sheathing with Integral Water and Air Barrier
- D. Section 06 16 63 Composite Insulating Wall Sheathing
- E. Section 07 27 26 Fluid-Applied Vapor-Permeable Membrane Air Barriers
- F. Section 09 21 16 Gypsum Board Assemblies

1.04 REFERENCES

- A. ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2014.
- B. <u>ASTM C303</u> Standard Test Method for Dimensions and Density of Preformed Block and Board—Type Thermal Insulation.
- C. ASTM C303 Standard Test Method for Dimensions and Density of Preformed Block and Board–Type Thermal Insulation; 10.
- D. ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- E. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2015.
- F. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- G. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2016.
- H. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- I. <u>ASTM C1104</u> Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
- J. ASTM D1621 Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2016.
- K. ASTM E2307 Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2015b, with Editorial Revision (2016).
- L. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

M. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

1.05 SUBMITTALS

- A. See Section 01 33 00 for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and accessories in insulation manufacture's original packaging with identification labels intact and in sizes to suit project.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Ensure insulation materials are not exposed to moisture during delivery or storage.

1.07 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Owens Corning Insulating Systems, LLC unless noted otherwise.
 - 1. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - a. Dow Chemical Company.
 - b. DiversiFoam Products.
 - c. Certain Teed Corporation.
 - d. ACH Foam Technologies, LLC.
 - e. Knauf Insulation.
 - f. Rockwool.
 - g. InsulFoam LLC (Carlisle)
 - h. Kingspan Insulation, LLC

2.02 APPLICATIONS

- A. Below Grade Insulation:
 - 1. Under-Slab and Perimeter Foundation Insulation: Extruded polystyrene rigid board.
 - 2. Continuous Insulation over Concrete Walls: Expanded polystyrene rigid board.
- B. Metal-Framed Exterior Wall Construction:
 - 1. Stud Cavity Insulation: Fiberglass batt insulation, faced or unfaced.
 - 2. Continuous Insulation: Extruded polystyrene rigid board over wall sheathing.
- C. Metal-Framed Interior Wall Construction:
 - 1. Stud Cavity Insulation: Sound attenuation batt insulation, unfaced.
- D. Wood-Framed Exterior Wall Construction:
 - 1. Stud Cavity Insulation: Fiberglass batt insulation, faced or unfaced.
 - 2. Continuous Insulation: Extruded polystyrene rigid board over wall sheathing.
- E. Wood-Framed Interior Wall Construction:
 - 1. Stud Cavity Insulation: Sound attenuation blanket insulation, unfaced.
- F. Insulation above Acoustical Ceilings: Fiberglass batt insulation, unfaced.
- G. Roof Deck Insulation: Refer to Section INSERT SECTION # for requirements.

2.03 EXPANDED POLYSTYRENE (EPS) INSULATION

- A. Manufacturer: InsulFoam LLC
 - 1. Contacts: P: 800-248-5995 / Web: www.insulfoam.com
- B. Product: Insulfoam 25 PSI Moisture-Resistant Insulation.
 - 1. Type Classification: ASTM C578, Type IX, unfaced.
 - 2. Board Thickness: As required to achieve R-value required by the 2015 IECC for continuous insulation (ci).
 - a. Insulation over Concrete Walls: R-7.5
 - b. Waterproofing Protection Barrier: R-7.5
- C. Physical Properties::
 - 1. Flame Spread Index (ASTM E84): Less than 20, Class A.
 - 2. Smoke Developed Index (ASTM E84): 150-300.
 - 3. Compressive Strength (ASTM D1621): 25 psi (173 kPa), minimum.
 - 4. Thermal Resistance (ASTM C518): R-value (RSI-value) of 4.35 (0.76) per 1 inch (25.4 mm) at 75 degrees F (24 degrees C) mean temperature.
 - 5. Density (ASTM C303): 2.0 pcf.
 - 6. Water Absorption (ASTM C272): 2-percent by volume, maximum.
 - 7. Water Vapor Permeance (ASTM E96): 2.0 perms, maximum.
 - 8. Flexural Strength, ASTM C 203: Minimum 50 psi.
 - 9. Dimensional Stability, ASTM D 2126: Maximum 2 percent.
- D. Accessories:
 - 1. Adhesive: Material and type compatible with EPS insulation board and acceptable to EPS insulation board manufacturer.
 - 2. Wall Ties: Material and type compatible with EPS insulation board and acceptable to EPS insulation board manufacturer.
 - 3. Mechanical Fasteners: Material and type compatible with EPS insulation board and acceptable to EPS insulation board manufacturer.
 - 4. Furring Channels: Material and type compatible with EPS insulation board and acceptable to EPS insulation board manufacturer.
- E. Uses: Refer to "Applications" Article this Section.

2.04 EXTRUDED POLYSTYRENE (XPS) INSULATION

- A. Manufacturer: Owens Corning Insulating Systems, LLC.
- B. Product: FOAMULAR® 250 XPS rigid board insulation,.
 - 1. Type Classification: ASTM C578, Type IV.
 - 2. Board Thickness: As required to achieve R-value required by the 2015 IECC for continuous insulation (ci):
 - a. Underslab and perimeter foundation insulation: R-10.
 - b. Exterior walls with continuous insulation over sheathing:
 - 1) Metal-framed wall systems: R-7.5ci
 - 2) Wood-framed wall systems: R-3.8ci
 - 3. Board Size: 48 by 96 inch (1220 by 2440 mm).
 - 4. Board Edges: Square.
- C. Physical Properties:
 - 1. Flame Spread Index (ASTM E84): 5.
 - 2. Smoke Developed Index (ASTM E84): 45-175.
 - 3. Density: 1.55 lb/cu ft.
 - 4. Compressive Strength (<u>ASTM D1621</u>): 25 psi (173 kPa), minimum.
 - 5. Thermal Resistance: R-value (RSI-value); 1 inch (25 mm) of material = R 5.0 (0.88) at 75 degrees F (24 degrees C) mean temperature.
 - 6. Water Absorption, Maximum (ASTM C272): 0.10-percent, by volume.
 - 7. Water Vapor Permeance (ASTM E96): 1.5 perms, maximum.

- Indoor Air Quality: Compliance certified by independent third party such as GREENGUARD Indoor Air Quality Certified® and/or GREENGUARD Children and Schools Certified.
- 9. Recycled Content: Minimum 20%, certified by independent third party such as Scientific Certification Systems.
- D. Uses: Refer to "Applications" Article this Section.

2.05 POLYISOCYANURATE INSULATION

- A. Refer to Section 07 52 01 for membrane roofing system requirements.
- B. Application: Insulation over wood roof decking.

2.06 ACOUSTIC BLANKET INSULATION (SOUND ATTENUATION BATTS)

- A. Manufacturer: Owens Corning Insulating Systems, LLC.
- B. Product: EcoTouch® Unfaced Sound Attenuation Batts (SABs).
 - 1. Type: Unfaced glass fiber acoustical insulation, complying with <u>ASTM C665</u>, Type I.
 - 2. Fire-Resistance: When installed in wall systems and tested per ASTM E119, assembly fire-resistance ratings up to 2-hours can be achieved.
 - 3. Insulation Thickness: 2-1/2 or 3-1/2 inches thick.
 - 4. Insulation Width: Provide16-inch wide batts to fit stud spacing, unless noted otherwise.
 - 5. Insulation Length: 96-inches.
- C. Physical Properties:
 - 1. Surface Burning Characteristics (ASTM E84): Flame Spread Index: 10; Smoke Developed Index: 10.
 - 2. Combustibility (ASTM E136): Non-combustible.
 - 3. Mold/mildew resistant per ASTM C138/C138M.
 - 4. Water Vapor Sorption (ASTM C1104): Less than 0.05 by volume, maximum.
 - 5. Dimensional Stability: Linear Shrinkage less than 0.1%.
- D. Acoustic Performance -
 - 1. Sound Transmission Class (STC) Ratings (ASTM C423):
 - 2. Metal-Framed Interior Partitions:
 - a. Partition Type A: Fire-Rated Interior Partitions.
 - 1) Fire-Rated Assembly and Rating:
 - (a) Partition Type A2: U.L. Design U469, 1-hour rated assembly.
 - (b) Partition Type A: U.L. Design U465, 1-hour rated assembly.
 - 2) Makeup: 5/8-inch Type X gypsum board each side of 20-gauge metal studs with SABs in stud cavity:
 - (a) 2-1/2 inch studs (Type 'A2') with 2-1/2 inch SABs: STC-47.**
 - (b) 3-5/8 inch studs (Type 'A') with 2-1/2 inch SABs: STC-47.**
 - b. Partition Type A, O, P, W: Non-Fire-Rated Interior Partitions.
 - 1) Makeup: 5/8-inch Type X gypsum board each side of metal studs with or without SABs in stud cavity:
 - (a) 1-5/8 inch studs without SABs: STC-38. **
 - (b) 2-1/2 inch studs without SABs: STC-40.**
 - (c) 3-5/8 inch studs without SABs: STC-39.**
 - (d) 3-5/8 inch studs with 2-1/2 inch SABs: STC-47.**
 - (e) 3-5/8 inch studs with 3-1/2 inch SABs: STC-46.**
 - c. Partition Type D: Fire-Rated Interior Partition.
 - 1) Wall Assembly per U.L. Design U411 (2-hour).
 - 2) Makeup: 2-layers of 5/8-inch Type X gypsum board each side of 20-gauge metal studs with SABs in stud cavity:
 - (a) 3-5/8 inch studs with 3-1/2 inch SABs: STC-56.**
 - d. Partition Type F1:
 - 1) Description: Fire-Rated Shaft Wall per U.L. Design U497 (2-hour).

- 2) Makeup: 1-inch shaftliner; 2-1/2 inch deep CH studs; and 2-layers of 5/8-inch Type X gypsum board:
 - (a) Partition without SABs: STC-41.**
 - (b) Partition with 1-1/2 inch SABs: STC-48.**
 - (c) Partition with resilient channels one side, with 1-1/2 inch SABs: STC-51.**
- e. Partition Type F1, F2, & F3:
 - 1) Fire-Rated Shaft Wall per U.L. Design U499 (1-hour).
 - 2) Makeup: 1-inch shaftliner; C-H shaped studs; 5/8-inch Type X gypsum board.
 - (a) 2-1/2 inch studs without SABs: STC-37.**
 - (b) 2-1/2 inch studs with 1-1/2 inch SABs: STC-42.**
 - (c) 4-inch studs with 3-1/2 inch SABs: STC-47.
 - (d) 6-inch studs with 3-1/2 inch SABs: STC-45.
- f. Partition Type E1: Chase Walls:
 - 1) Fire-Rated Chase Wall per U.L. Design U420 (1-hour).
 - 2) Makeup: 5/8-inch Type X gypsum board each side of double row of 1-5/8 inch studs spaced 24-inches on-center with gypsum board gussets:
 - (a) Wall with 3-1/2 inch SABs one side of wall: STC-52.
- 3. Wood-Framed Interior Partitions:
 - a. Partition Type _____: Standard Interior Partitions:
 - 1) Fire-Rated Wall (If applicable): U.L. Design U305, 1-hour rated assembly.
 - 2) Makeup: 5/8-inch Type X gypsum board each side of wood studs with SABs in stud cavity:
 - (a) 2X4 studs with 3-1/2 inch SABs: STC-36.
 - (b) 2X4 studs with resilient channels one side, and 3-1/2 inch SABs: STC-51
 - (c) 2X4 studs, resilient channels each side, 2-1/2 SABs: STC-50.
 - b. Partition Type _____: Standard Interior Partition:
 - 1) Fire-Rated Wall (If applicable): U.L. Design U301, 2-hour rated assembly.
 - 2) Makeup: 2-layers of 5/8-inch Type X gypsum board on each side of wood studs with SABs in stud cavity :
 - (a) 2X4 studs with 3-1/2 inch SABs: STC-41.
 - (b) 2X4 studs with resilient channels one side, and 3-1/2 inch SABs: STC-58.
 - c. Partition Type _____: Chase Walls, Aligned:
 - 1) Fire-Rated Wall (If applicable): U.L. Design U341, 1-hour rated assembly.
 - 2) Makeup: 5/8-inch Type X gypsum board each side of double row 2X4 studs spaced 16-inches on-center on separate plates, studs aligned:
 - (a) Partition with 3-1/2 inch SABs one side: STC-51.
 - (b) Partition with 3-1/2 inch SABs both sides: STC-54.
 - d. Partition Type _____: Chase Wall, Staggered:
 - 1) Fire-Rated Wall (If applicable): GA File Design WP-5515, 1-hour rated assembly.
 - Makeup: 5/8-inch Type X gypsum board each side of double row 2X4 studs spaced 16-inches on-center, staggered 8-inches on-center on 2X6 plates:
 (a) Wall with 3-1/2 inch SABs: STC-45.
 - Partition Type _____: Chase Wall, Aligned
 - 1) Fire-Rated Wall (If applicable): U.L. Design WP-3820, 2-hour rated assembly.
 - Makeup: 5/8-inch Type X gypsum board each side of double row 2X4 studs spaced 16-inches on-center on separate plates, studs aligned:
 - (a) Partition with 3-1/2 inch SABs one side: STC-51.
 - (b) Partition with 3-1/2 inch SABs both sides: STC-54.
 - f. Partition Type _____: Chase Wall, Staggered:
 - 1) Fire-Rated Wall (If applicable): U.L. Design WP-5530, 2-hour rated assembly.
 - 2) Makeup: 2-layers of 5/8-inch Type X gypsum board each side of double row 2X4 studs spaced 16-inches on-center and staggered 8-inches on-center on 2X6 plates:
 - (a) Partition with 3-1/2 inch SABs: STC-53.

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2.07 GLASS-FIBER BLANKET (BATT) INSULATION

- A. Manufacturer: Owens Corning Insulating Systems, LLC.
- B. Glass-Fiber Blanket (Batt) Insulation, General:
 - 1. Insulation Width: Where indicated, provide16-inch batts to fit stud spacing.
 - 2. Insulation Length: 48-inches or 96-inches.
 - 3. Facings:
 - a. Plenum Space: Where indicated, provide Aluminum foil, one side.
 - b. Non-Plenum Spaces: Where indicated, provide Asphalt treated Kraft paper, one side.
 - 4. Formaldehyde Content: Zero.
 - 5. Corrosiveness (ASTM C665): Passes.
 - 6. Fungi Resistance (ASTM C1338): Passes.
- C. Products:
 - 1. EcoTouch® Unfaced Thermal Batt Insulation: ASTM C665, Type I, preformed formaldehyde free glass fiber batt type, unfaced.
 - a. Physical Properties:
 - 1) Combustibility (ASTM E136): Non-combustible.
 - 2) Mold/mildew resistant per ASTM C138/C138M.
 - 3) Surface Burning Characteristics (ASTM E84):Flame Spread: 10; Smoke Developed Index: 10.
 - 4) Water Vapor Sorption (ASTM C1104): 5-percent by weight, maximum.
 - 5) Dimensional Stability: Less than 0.1-percent linear shrinkage.
 - 6) Maximum Use Temperature (<u>ASTM C411</u>): 450°F.
 - 2. EcoTouch® Kraft-Faced Thermal Batt Insulation: ASTM C 665, Type II, Class C preformed formaldehyde free glass fiber batt type, Kraft paper faced one side.
 - a. Physical Properties:
 - 1) Surface Burning Characteristics (ASTM E84): Not rated.
 - 2) Mold/mildew resistant per ASTM C138/C138M.
 - 3) Perm Rating (ASTM E96): 1 perm maximum.
 - 4) Water Vapor Sorption (ASTM C1104): 5-percent by weight, maximum.
 - 5) Dimensional Stability: Less than 0.1-percent linear shrinkage.
 - 3. EcoTouch® Foil-Faced Thermal Batt Insulation: ASTM C 665, Type III, Class C preformed formaldehyde free glass fiber batt type, foil faced one side.
 - a. Surface Burning Characteristics (ASTM E84): FlameSpread: 75; Smoke Developed Index: 150.
 - b. Perm Rating: 0.5 perm maximum per ASTM E96.
 - c. Water Vapor Sorption (ASTM C1104): 5-percent by weight, maximum.
 - d. Dimensional Stability: Less than 0.1-percent linear shrinkage.
 - EcoTouch® FS-25 Thermal Batt Insulation: ASTM C 665, Type II (PSK facing), or Type III (FSK facing), Class A preformed formaldehyde free glass fiber batt, poly/scrim/Kraft (PSK) or foil/scrim/Kraft (FSK) faced on one side.
 - a. Flame Spread Index: Less than 25; Smoke Developed Index: Less than 50 per ASTM E84.
 - b. ICC building construction classification: all types.
 - c. Perm Rating: 0.02 maximum per ASTM E96.
- D. Metal-Framed Wall Construction:
 - Insulation Thickness and Thermal Resistance (R-value): ASTM C518:
 - a. Interior wood-framed walls:
 - 1) Refer to "Acoustic Blanket Insulation" Article this Section
 - b. Exterior metal-framed walls with continuous insulation: 3-1/2 inches, R-13 (min.) in stud cavity to comply with 2015 IECC.
 - 1) Refer to "Expanded Polystyrene (EPS) Insulation " Article this Section for continuous insulation requirements.
- E. Wood-Framed Wall Construction:

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- 1. Insulation Thickness and Thermal Resistance (R-value): ASTM C518:
 - a. Interior wood-framed walls:
 - 1) Refer to "Acoustic Blanket Insulation" Article this Section
 - b. Exterior wood-framed walls with continuous insulation:
 - 1) 3-1/2 inches, R-13 (min.) in stud cavity to comply with 2015 IECC.
 - 2) Refer to "Expanded Polystyrene (EPS) Insulation" Article this Section for continuous insulation requirements.
- F. Accessories: Provide accessories per insulating system manufacturer's recommendations, including the following:
 - 1. Tape: Polyethylene self-adhering type for Kraft faced insulation and bright aluminum self-adhering type for foil faced insulation.
 - 2. Insulation Fasteners: Impale clip of galvanized steel; type recommended by insulation manufacturer for particular use intended.
 - 3. Mechanical Insulation Fasteners: FM approved, corrosion resistant, size required to suit application.
 - 4. Wire Mesh: Galvanized steel, hexagonal wire mesh.
 - 5. Spindle Fasteners: Corrosion-resistant wire spindles.
 - 6. Ventilation Baffles: Formed plastic, metal, or cardboard sized to fit full width of rafter spaces.

2.08 MINERAL WOOL INSULATION

- A. Applications:
 - 1. Thermal and acoustical insulation.
 - 2. Perimeter fire containment systems.
 - 3. Fire resistive joint systems in rated assemblies.
 - 4. Firestopping of through penetrations in rated assemblies.
- B. Manufacturer: Thermafiber, Inc. (an Owens Corning company).
 - 1. Contacts: P: (888) 834-2371 / Web: www.thermafiber.com
- C. Mineral Wool Insulation at Non-Fire Rated Interior Walls and Ceilings:
 - 1. Product: VersaBoard 35, Semi-Rigid Mineral Wool Insulation Board.
 - a. Compliance: Non-combustible, semi-rigid mineral wool insulation board, water repellent, complying with ASTM C612, Type 1A.
 - b. Fire resistant to temperatures above 2,000 degrees F.
 - c. R-Value: 4.2 per inch.
 - d. Density: 3.5 pcf (actual).
 - e. Facing: Unfaced.
 - f. Board Thickness: 1-1/2 to 7-inches, in 1/2-inch increments.
 - g. Board Width: Where indicated, provide24-inch or 36-inch.
 - h. Board Length: 48-inches or 60-inches.
 - 2. Acoustical Performance: In accordance with ASTM C423.
 - 3. Physical Properties:
 - a. Surface Burning Characteristics (ASTM E84):
 - 1) Unfaced: Smoke Developed: 0, Flame Spread: 0.
 - 2) Foil Faced: Smoke Developed: 0, Flame Spread: 25 or less.
 - b. Moisture Resistance (ASTM C1104): Absorption of less than 1.0-percent by volume.
 - c. Corrosivity (ASTM C665): Non-corrosive.
 - d. Fiber Type: Standard fiber; 70-percent pre-consumer recycled content.
 - e. Post-Consumer Recycled Content: 0 percent.
 - f. UL Certified Environmental Product Declaration in accordance with ISO 14025.
 - 4. Installation:
 - a. Interior stud cavities.
 - b. Ceiling Overlayment:
- D. Mineral Wool Insulation at Fire-Rated Interior Walls and Ceilings:

- 1. Product: Sound Attenuation Fire Blanket (SAFB), unfaced.
 - a. Compliance: Flexible or semi-rigid pre-formed batt or blanket, complying with ASTM C665, Type I (unfaced).
 - b. Formaldehyde Free (FF)
 - c. R-Value: 4.2 per inch.
 - d. Density:
 - 1) 1-inch thick: 4.0 pcf, nominal.
 - 2) Thicker than 1-inch: 2.5 pcf, nominal.
 - e. Facing: Unfaced.
 - f. Blanket Thickness:
 - 1) 2.5 pcf Density: 1-1/2 to 7-inches, in 1/2-inch increments.
 - 2) 4.0 pcf Density: 1-inch.
 - g. Blanket Width: Where indicated, provide24-inch or 36-inch.
 - h. Blanket Length: 48-inches.
- 2. Acoustical Performance: In accordance with ASTM C423.
- 3. Physical Properties:
 - a. Surface Burning Characteristics (ASTM E84):
 - 1) Unfaced: Smoke Developed: 0, Flame Spread: 0.
 - b. Moisture Resistance (ASTM C1104): Absorption of less than 1.0-percent by volume.
 - c. Corrosivity (ASTM C665): Non-corrosive.
 - d. <u>NFPA 101</u>: Class A rated interior finish.
 - e. GREENGUARD GOLD Certified.
 - f. ULE Validated Formaldehyde Free.
 - g. Fiber Type: Standard fiber; 70-percent pre-consumer recycled content.
- 4. Installation:
 - a. Interior Stud Cavities: Friction fit SAFB[™] securely between studs. Butt ends of blankets closely together and fill all voids.
 - b. Ceiling Overlayment: Lay SAFB over ceiling panels extending 48-inches beyond all partitions. Tightly fit around all hangers, obstructions, and penetrations.

2.09 PERIMETER FIRE CONTAINMENT SYSTEMS

- A. General: Provide where indicated for gaps between the perimeter edge of fire-resistance-rated floor assemblies and non-fire-resistance-rated exterior curtain walls.
 - 1. Provide a perimeter fire-containment system with the fire test response characteristics indicated, as determined by testing identical systems per the Underwriters Laboratories or Intertek (OPL) Laboratories, or another testing and inspecting agency accountable to authorities having jurisdiction.
 - 2. If no tested system exists, an engineering judgment provided by the manufacturer, 3rd party testing lab, or fire protection engineering firm that follows guidelines established by the International Firestop Council must accompany the design.
 - 3. For non-fire resistance rated floor assemblies add an approved material or assembly for retarding the passage of flame and hot gasses.
- B. Curtain Wall Insulation:
 - 1. Applications:
 - a. Thermal and acoustical insulation.
 - b. Fire containment.
 - c. Vapor control.
 - 2. Manufacturer: Thermafiber, Inc. (an Owens Corning company).
 - a. Contacts: P: (888) 834-2371 / Web: www.thermafiber.com
 - 3. Products:
 - a. Thermafiber FireSpan 90 Insulation, mineral wool.
 - 1) Compliance: ASTM C612, Type IA, IB, II, III, IVA.
 - 2) Density: 8.0 pcf.
 - 3) R-Value: 4.3 per inch.

- 4) Facing: Foil Faced.
- 5) Thickness: 1- to 7-inches, in 1/2-inch increments.
- 6) Width: Where indicated, provide24-inch, 36-inch, or 72-inch.
- 7) Length: 48-, 60-, or 72-inches.
- b. Thermafiber FireSpan 40 Insulation, mineral wool.
 - 1) Compliance: ASTM C612, Type IA, IB, II, III, IVA.
 - 2) Density: 4.0 pcf.
 - 3) R-Value: 4.3 per inch.
 - 4) Facing: Foil Faced.
 - 5) Thickness: 2 to 7-inches, in 1/2-inch increments.
 - 6) Width: Where indicated, provide24-inch, 36-inch, or 72-inch.
 - 7) Length: 48-, 60-, or 72-inches.
- c. Minimum thickness and density as noted in UL Design references on drawings
- 4. Physical Properties:
 - a. Surface-Burning Characteristics: Tested in accordance with ASTM E84:
 - 1) Unfaced: Maximum flame spread:0, and smoke-developed:0.
 - 2) Foil Faced: Maximum flame spread: 25, and smoke-developed: 0.
 - b. Corrosivity (ASTM C665): Non-corrosive.
 - c. Water Vapor Sorption (ASTM C1104): Less than 1 percent by volume.
 - d. Water Permeance (ASTM E96/E96M): Unfaced: 50 perms, Foil Faced: 0.02 Perms.
 - e. ASTM E136: Noncombustible, Passes.
- C. Safing Insulation:
 - 1. Manufacturer: Thermafiber, Inc. (an Owens Corning company).
 - a. Contacts: P: (888) 834-2371 / Web: www.thermafiber.com
 - 2. Product: "Thermafiber Safing Insulation", Mineral wool.
 - a. Type: Designated Type SAF in UL Fire Resistance Directory.
 - b. Facing: Unfaced.
 - c. Thickness: 1-1/2 to 7-inches, in 1/2-inch increments.
 - d. Width: Where indicated, provide16-inch, 24-inch, or 36-inch.
 - e. Length: 48-inches or 60-inches.
 - f. Density: 4.0 pcf or 6.0 pcf (actual), as noted in UL Design references on drawings.
 - 3. Applications:
 - a. Perimeter Installation: Safing insulation should be compression fitted between the slab edge and the curtain wall insulation, leaving no voids.
 - b. Penetration Application: Safing insulation should be cut slightly larger than the opening and compression fitted into the opening, leaving no voids.
 - c. Construction Joint Application: Safing insulation should be compression fitted into the joint opening, leaving no voids.
 - 4. Peformance:
 - a. Perimeter Fire Containment Tests (ASTM E2307):
 - 1) Aluminum Spandrel Curtain Wall Fire Containment
 - 2) Steel Stud-Framed / Gypsum Sheathing Curtain Wall Fire Containment
 - 3) Glass Spandrel Curtain Wall Fire Containment
 - 4) Granite Spandrel Curtain Wall Fire Containment
 - 5) Precast Concrete Spandrel
 - 5. Physical Properties:
 - a. Surface-Burning Characteristics (ASTM E84):
 - 1) Unfaced: Maximum Flame Spread: 0, Smoke Developed: 0.
 - b. Corrosivity (ASTM C665): Non-corrosive.
 - c. Fiber Type: Standard fiber; 70 percent pre-consumer recycled content
 - d. UL Certified Environmental Product Declaration in accordance with ISO 14025.
- D. Accessories:

- 1. Safing Clips: Z-Shaped galvanized steel clips formed from 1 inch wide strips of 20 gauge galvanized steel; 3 inches high with 2 inch and 3 inch upper and lower horizontal legs. Use where required by specific UL or OPL/Intertek design.
- 2. Hardware: Thermafiber Impasse hardware for attaching curtain wall insulation or other mechanical fasteners as approved by the Manufacturer.
- 3. Mullion Covers: Thermafiber FireSpan 90 Insulation for protection of mullions. Refer to specific UL/Intertek designs for size of mullion covers.
- 4. Backer / Reinforcement Member: Thermafiber Impasse T-Bar or galvanizes steel channel or angle (see specific listing for appropriate gauge of steel) approved by the primary manufacturer. Place horizontally at the safe-off line to support the curtain wall insulation to prevent bowing of curtain wall insulation caused by compression fitting of the Safing insulation. See specific listed design for system requirements.
- 5. Smoke Barrier: Smoke sealant as listed in the appropriate fire tested assembly.
- 6. Vapor Retarder Tape: Compatible with specified facer and comparable perm rating. For taping insulation joints and repairing tears.

2.10 FIRE RESISTIVE JOINT SYSTEMS IN RATED ASSEMBLIES

- A. Insulation for Joint Packing:
 - 1. Product for Construction Joints: Thermafiber Safing Insulation Type SAF.
 - 2. Product for Head of Wall Applications: Thermafiber Top-Stop Insulation.
 - 3. Facing: Unfaced.
 - 4. Surface Burning Characteristics: Flame Spread 0 and Smoke Developed 0; tested in accordance with ASTM E84.
 - 5. Corrosivity: Non-corrosive, when tested in accordance with ASTM C665.
 - 6. Fiber Type: Standard fiber; 70 percent pre-consumer recycled content
 - 7. UL Certified Environmental Product Declaration in accordance with ISO 14025.
 - 8. This product qualifies under the Department of Homeland Security SAFETY Act designation which provides commercial building professions and building owners liability protection in the event of a foreign/domestic act of terrorism.
- B. Smoke Barrier Sealant: Smoke sealant as listed in the appropriate fire tested assembly.

2.11 FIRESTOPPING OF THROUGH PENETRATIONS IN RATED ASSEMBLIES

- A. Safing Insulation: Refer to "Safing Insulation" Article above for requirements.
- B. Smoke Barrier Sealant: Smoke sealant as listed in the appropriate fire tested assembly.

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.

3.02 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated, and <u>ASTM C1320</u>.
- B. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- C. Provide continuous coverage of sound-attenuation batts within partitions. Confirm that batts remain friction fit within framing before enclosing.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.03 INSTALLATION - RIGID BOARD INSULATION

A. Exterior Walls, Continuous Installation: Install insulation board vertically or horizontally over exterior sheathing. Fasten vertically 12 inches (300 mm) maximum on centers using fasteners recommended by manufacturer.

- B. Concrete and Masonry Walls: Install insulation board directly to exterior of concrete and unit masonry substrates as recommended by manufacturer.
 - 1. Remove jagged surfaces or surface irregularities prior to installation.
 - 2. Attach insulation by using polystyrene compatible adhesive or an approved mechanical fastener.
 - 3. Butt edges tightly.
- C. Cavity Walls: Install insulation board on exterior surface of interior wythe of cavity wall, fitting board between wall ties and other projections and penetrations without large gaps or openings.
 - 1. Remove jagged surfaces or surface irregularities prior to installation.
 - 2. Attach insulation in conformance with the applicable code.
 - 3. Maintain installed insulation to a point above the outer wythe as the work progresses to keep mortar from blocking the cavity.
 - 4. Maintain a space between the insulation and the inside face of the outer wythe of at least 3/4 inch.
 - 5. Stagger multiple layers of insulation. Butt edges tightly.
 - 6. Tape all horizontal and vertical joints in the insulation with PolyGard 136 tape.
- D. Below Grade:
 - 1. Protection Board and Perimeter Foundation Insulation: Install insulation board on exterior surface of perimeter foundation walls and footings.
 - a. Remove jagged surfaces or surface irregularities prior to installation.
 - b. Verify that damproofing or waterproofing is fully cured prior to application over such surfaces.
 - c. Attach insulation by pressing into cured damproofing or waterproofing or by using polystyrene compatible adhesive.
 - d. Butt edges tightly.
 - e. Apply polystyrene compatible sealant to the joint between the substrate and the insulation board to minimize water infiltration behind the insulation.
 - f. Do not allow insulation board to be exposed for an extended period of time to protect from UV exposure and damage from other trades.
 - g. Carefully backfill without displacing or damaging the insulation board.
 - 2. Under Slab-On-Grade: Install insulation board under slab-on-grade and over properly prepared subgrade of compacted fill and vapor retarder. Place insulation board with sides and ends butted.
 - a. Prepare subgrade by removing surface irregularities prior to installation.
 - b. Install vapor barrier over subgrade to protect against dampness and moisture penetration.
 - c. Butt edges tightly.
 - d. Do not allow insulation board to be exposed for an extended period of time to protect from UV exposure and damage from other trades.
 - e. Carefully install reinforcing and concrete without displacing or damaging the insulation board.

3.04 INSTALLATION - BATT INSULATION

- A. Friction-fit blanket insulation in place, until the interior finish is applied. Install batts to fill entire stud cavity, with no gaps, voids, or areas of compression. If stud cavity is less than 8 feet in height, cut lengths to friction fit against floor and ceiling tracks. Walls with penetrations require that insulation be carefully cut to fit around outlets, junction boxes, and other irregularities.
 - 1. Do not install insulation on top of or within 3 inches of recessed light fixtures unless the fixtures are approved for such use.
- B. Within exterior wall framing, install insulation between pipes and backside of sheathing. Cut or split insulation material as required to fit around wiring and plumbing.
- C. If eave ventilation baffles are required, install ventilation baffles at eaves to hold insulation down from roof sheathing and provide positive ventilation from eave to attic space.

- D. Fluff insulation to full thickness for specified R-value before installation. Do not compress insulation in the cavity during installation, creating gaps or voids that could diminish thermal value.
- E. Trim insulation neatly to fit spaces. Fill miscellaneous gaps and voids with insulation.
- F. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
- G. For unfaced batt insulation, install with friction fit or retain in place with manufacturer's recommended fasteners or mesh.
- H. For batt insulation with factory-applied facing, install with vapor retarder membrane facing warm in the winter side of building spaces or as specified by local building code. Lap ends and side flanges of membrane over or between framing members. Tape to seal tears, cuts or misalignments in membrane.
- I. Secure insulation in place using one of the following methods: Friction fit; staple or nail facing flanges in place as needed, tape in place, retain in place with spindle fasteners, retain in place with wire mesh secured to framing members.
- J. Retain insulation batts in place with wire mesh secured to framing members where insulation will be exposed.

3.05 INSTALLATION - PERIMETER FIRE CONTAINMENT SYSTEMS

- A. Comply with tested and listed systems. Install products in proper relationship with each other and adjacent construction and as follows:
 - 1. Backer Reinforcement Members for Perimeter Fire Containment System:
 - a. Install backer reinforcement member in accordance with the listed tested system.
 - b. Install Thermafiber Impasse T-Bar or an approved light steel angle or channels (see specific listing for appropriate gauge of steel), placed horizontally at the safing line, attached to the vertical mullions either within the insulation at a horizontal splice, or behind the insulation and mechanically attached to vertical mullions.
 - c. Install to prevent the bowing of the curtain wall insulation due to the compression fit of the safing insulation.
 - 2. Curtain Wall Insulation:
 - a. Install curtain wall insulation in accordance with Underwriters Laboratories / Intertek (OPL) Laboratories listed system and manufacturer's instructions.
 - b. Install backer bar assembly in accordance with the listed and tested design. Not applicable when the Thermafiber No Backer Bar system is specified.
 - c. Fasten insulation in place with mechanical fasteners within the mullions and transoms (spandrel area), spaced at intervals recommended by listed and tested assembly to hold insulation securely in place without touching the exterior wall. One inch air space must be maintained.
 - d. Provide Thermafiber Impasse hardware or mechanical fasteners as approved by Architect and manufacturer.
 - e. Comply with specific listed and tested assemblies for mechanical fastener requirements.
 - f. Maintain cavity width of dimension indicated between insulation and exterior wall.
 - 3. Safing Insulation Type SAF:
 - a. Install safing insulation of proper size in safe off area between curtain wall insulation and floor slab as prescribed by the listed and tested assembly. Safing insulation direction and compression as well as the absence of safing Z-clips are prescribed by the listed and tested assembly.
 - b. Install safing insulation of proper density and size into perimeter joint, construction joints (head-of-wall, floor-to-floor, floor-to-wall, etc.) as prescribed by the listed and tested assembly.
 - c. Install safing insulation of proper density and size into poke-throughs and penetrations as prescribed by the listed and tested assembly.

- 4. Smoke Barrier System:
 - a. Utilize foil faced FireSpan curtain wall Insulation with Thermafiber Safing Insulation.
 - b. Apply approved smoke sealant in accordance with the tested assembly.
 - c. Install safing insulation of proper density and size as prescribed by the listed and tested assembly.
 - d. Install safing insulation of proper density and size into poke-throughs and penetrations as prescribed by the tested assembly.
 - e. Apply approved smoke sealant in accordance with the tested assembly.
- 5. Vapor Retarders:
 - a. Seal all joints in curtain wall insulation or exterior wall insulation with vapor retarder tape.
 - b. Application of vapor retarder must be directed by Architect of Record or Mechanical Engineer of project.
 - c. For continuous vapor barrier repair all tears in insulation foil facing with vapor retarder tape.

3.06 PROTECTION

A. Protect installed insulation from damage due to weather and physical abuse until protected by permanent construction.

END OF SECTION

SECTION 07 24 00

EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Provide air and moisture barrier, and compatible EIFS for vertical above grade exterior walls.

1.03 RELATED SECTIONS

Section 05 40 00 - Cold-Formed Metal Framing.

Section 06 10 00 - Rough Carpentry.

Section 06 16 00 - Glass-Mat Gypsum Sheathing

Section 07 62 00 - Sheet Metal Flashing and Trim.

Section 07 92 00 - Joint Sealants.

1.04 REFERENCES

- A. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus; 2016.
- B. ASTM C1177/C1177M Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- C. ASTM C150/C150M Standard Specification for Portland Cement; 2016.
- D. ASTM C297/C297M Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions; 2016.
- E. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2016.
- F. ASTM C1382 -
- G. ASTM C1397 Standard Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage; 2013.
- H. ASTM D968 Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 2015.
- I. ASTM D2247 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity; 2015.
- J. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- K. ASTM E2570/E2570M Standard Test Methods for Evaluating Water-Resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage; 2007, with Editorial Revision (2014).
- L. ASTM E330/E330M Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- M. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- N. ASTM E2273 Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies; 2003 (Reapproved 2011).
- O. ASTM E2485/E2485M Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings; 2013.
- P. ASTM E2486/E2486M Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS); 2013.
- Q. ASTM E2568 -

- R. ASTM G153 Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.
- S. ASTM G155 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.
- T. ISO 9001 Quality management systems -- Requirements; 2015.
- U. NFPA 268 Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source; 2012.
- V. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.05 DEFINITIONS

- A. Base Coat: Material used to encapsulate one or more layers of reinforcing mesh fully embedded that is applied to the outside surface of the EPS.
- B. Building Expansion Joint: A joint through the entire building structure designed to accommodate structural movement.
- C. EIFS: Exterior Wall Insulation and Finish System.
- D. Expansion Joint: A structural discontinuity in the EIFS.
- E. Finish: An acrylic-based coating that is applied over the base coat.
- F. Insulation Board: Expanded polystyrene (EPS) insulation board, which is affixed to the sheathing substrate and creates a layer of continuous insulation.
- G. Reinforcing Mesh: Glass fiber mesh(es) used to reinforce the base coat and to provide impact resistance.
- H. Sheathing: The substrate to which the EIFS is affixed.

1.06 SYSTEM DESCRIPTION

- A. General: Exterior Insulation and Finish System (EIFS), Class PB, consisting of an air/water-resistive barrier, an adhesive, grooved expanded polystyrene insulation board, flashings and trim, base coat, reinforcing mesh(es) and finish.
- B. Method of Installation
 - 1. Field Applied: The Outsulation MD System is applied to the substrate system in place.

1.07 DESIGN REQUIREMENTS

- A. Sheathing Substrate: Refer to Section 06 16 00.
- B. Wind Load
 - 1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
 - 2. Design for wind load in conformance with code requirements.
 - 3. Maximum wind load resistance: + 188 psf (9.00 kPa), provided structural supports and sheathing/sheathing attachment are adequate to resist these pressures.
- C. Moisture Control
 - 1. Prevent the accumulation of water behind the EIFS or into the wall assembly, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly:
 - a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall.
 - b. Air Leakage Prevention provide continuity of the air barrier system at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components to minimize condensation and leakage caused by air movement.
 - c. Vapor Diffusion and Condensation perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for

accumulation of moisture in the wall assembly by diffusion. Adjust insulation thickness and/or other wall assembly components accordingly to minimize risk. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.

- D. Impact Resistance
 - 1. Provide ultra-high impact resistance of the EIFS to a minimum height of 8'-0" above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Indicate the areas with impact resistance other than "Standard" on contract drawings.
- E. Joints
 - 1. Provide minimum 3/4 inch (19 mm) wide joints in the EIFS where they exist in the substrate or supporting construction, where the cladding adjoins dissimilar construction or materials, at changes in building height, at expansion, control, and cold joints in construction, and at floor lines in multi-level wood frame construction. Size joints to correspond with anticipated movement. Align terminating edges of EIFS with joint edges of through wall expansion joints and similar joints in construction. Refer to Sto Details.
 - 2. Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through the EIFS (windows, doors, mechanical, electrical, and plumbing penetrations, etc.).
 - 3. Specify compatible backer rod and sealant that has been evaluated in accordance with <u>ASTM C 1382</u>, and that meets minimum 50% elongation after conditioning.
 - 4. Provide joints so that air barrier continuity is maintained across the joint, and drain joints to the exterior, or provide other means to prevent or control water infiltration at joints.
- F. Terminations
 - 1. Prior to applying the system, wall openings shall be treated with a Flashing System or Flashing Tape.
 - 2. The system shall be held back from adjoining materials around openings and penetrations such as windows, doors, and mechanical equipment a minimum of 3/4-inches for sealant application.
 - 3. The systemshall be terminated a minimum of 8-inches above finished grade.

1.08 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.
- C. Shop Drawings: Include plans, elevations, sections, details of components, details, penetrations, terminations, joints, fasteners, and attachments to other work.
- D. Selection Samples: Submit manufacturer's standard range of samples illustrating available coating colors and textures.
- E. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches (300 mm) square, illustrating project colors and textures.
- F. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

1.09 QUALITY ASSURANCE

- A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site during installation.
- B. EIFS Manufacturer Qualifications: Provide EIFS products other than insulation from the same manufacturer with qualifications as follows:
 - 1. Member in good standing of EIMA (EIFS Industry Members Association).
 - 2. Manufacturer of EIFS products for not less than 30 years.
 - 3. Manufacturing facilities ISO 9001 certified.
- C. Insulation Manufacturer Qualifications: Approved by manufacturer of EIFS and approved and labeled under third party quality program as required by applicable building code.

D. Installer Qualifications: Company specializing in the type of work specified and with at least three years of documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.
- B. Storage: Store materials as directed by manufacturer's written instructions.
 1. Protect insulation materials from exposure to sunlight.

1.11 FIELD CONDITIONS

- A. Do not prepare materials or apply EIFS under conditions other than those described in the manufacturer's written instructions.
- B. Do not prepare materials or apply EIFS during inclement weather unless areas of installation are protected. Protect installed EIFS areas from inclement weather until dry.
- C. Do not install coatings or sealants when ambient temperature is below 40 degrees F (5 degrees C).

1.12 SEQUENCING AND SCHEDULING

- A. Installation of the EIFS shall be coordinated with other construction trades.
- B. Sufficient manpower and equipment shall be employed to ensure a continuous operation, free of cold joints, scaffold lines, texture variations, etc.

1.13 WARRANTY

- A. See Section 01 78 00 Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's shall provide a written moisture drainage and limited materials warranty against defective material, for a period of 10 years from the Date of Substantial Completion.
- C. Provide separate warranty from installer covering workmanship for a period of 1 year from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Products from <u>Sto Corporation</u> are specified to establish a standard of quality for design, function, materials, and appearance.
- B. Substitutions: Refer to Section 01 25 00 Substitution Procedures.
- C. Basis of Design Product:
 - 1. Sto Corp; StoTherm ci Essence,
 - a. Provide Air/Moisture Barrier and EIFS coatings and accessories from single source manufacturer or approved supplier.

2.02 EXTERIOR INSULATION AND FINISH SYSTEM

A. All components of the EIFS shall be supplied or obtained from Sto Corporation or its authorized distributors. Substitutions or additions of materials other than specified will void the warranty.

2.03 PERFORMANCE REQUIREMENTS

- A. Comply with ASTM E2570/E2570M (Air/Moisture Barrier) and <u>ASTM E2568</u> (EIFS):
- B. Wind Loading: Withstand positive and negative wind loads as specified by the building code, when tested in accordance with ASTM E330/E330M.
- C. Fire Characteristics:
 - 1. Flammability: Pass, when tested in accordance with 1.
 - 2. Ignitibility: No sustained flaming when tested in accordance with NFPA 268.
 - 3. Fire Resistance: Complies with fire resistance requirements indicated on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.

- D. Adhesion of Water-Resistive Coating to Substrate: For each combination of coating and substrate, minimum flatwise tensile bond strength of 15 psi (105 kPa), when tested in accordance with ASTM C297/C297M.
- E. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E331 at 6.24 psf (299 Pa).
- F. Drainage Efficiency: Average minimum efficiency of 90 percent, when tested in accordance with ASTM E2273 for 75 minutes.
- G. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B117.
- H. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 10 cycles, when tested in accordance with ASTM E2485/E2485M.
- I. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 2000 hours of accelerated weathering conducted in accordance with ASTM G155 Cycle 1.
- J. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D2247.
- K. Mildew Resistance: No growth supported on finish coating during 28 day exposure period, when tested in accordance with ASTM D3273.
- L. Abrasion Resistance of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D968 with 528 quarts (500 liters) of sand.
- M. Impact Resistance: Construct system to provide the following impact resistance without exposure of broken reinforcing mesh, when tested in accordance with ASTM E2486/E2486M:
 - 1. Standard: 25 to 49 in-lb (2.83 to 5.54 J), for areas above those that receive high-impact resistance.
 - 2. Medium: 50 to 89 in-lb (5.65 to 10.1 J), for areas indicated on drawings.
 - 3. High: 90 to 150 in-lb (10.2 to 17 J), for areas from finished grade to 8-0" above finished floor elevation.

2.04 AIR / MOISTURE BARRIER

- A. StoGuard®:
 - 1. Joint Treatment, Rough Opening Protection, and Detail Components:
 - a. StoGuard RapidSeal[™] one component rapid drying gun-applied rough opening protection for frame and CMU walls without mesh or fabric reinforcement. Also use as a joint treatment for sheathing when used with StoGuard Mesh. Also used to seal fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials
- B. Waterproof Coating:
 - 1. Sto Gold Coat® ready mixed waterproof coating for concrete, concrete masonry, wood-based sheathing, and glass mat gypsum sheathing
- C. Transition Detail Components:
 - 1. StoGuard Transition Membrane flexible air barrier membrane for continuity at static transitions such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, and shingle lap transitions of flashing. Also used for dynamic joints: floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction

2.05 ADHESIVE

A. Sto Primer Adhesive-B - factory blended one-component polymer-modified portland cement based adhesive

2.06 INSULATION BOARD

- A. Sto EPS Insulation Board: nominal 1.0 lb/ft3 (16 kg/m3) Expanded Polystyrene (EPS) insulation board in compliance with <u>ASTM E2430</u> and ASTM C578 Type I requirements and listed, and labeled.
- B. Board Thickness: As indicated on drawings.

2.07 BASE COAT

- A. Cementitious Base Coat
 - 1. Sto Primer/Adhesive-B factory blended one component polymer modified portland cement based base coat. Also used as a leveler for concrete and masonry surfaces
 - a. Sto Primer/Adhesive acrylic based base coat field mixed with portland cement. Also used as a leveler for concrete and masonry surfaces

2.08 REINFORCING MESHES

- A. Standard Mesh
 - 1. Sto Mesh nominal 4.5 oz/yd2 (153 g/m2), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials (achieves Standard Impact Classification).
 - 2. Application: Standard-impact reinforcing mesh for all walls above the heavy-duty reinforcing mesh.
- B. High Impact Mesh
 - 1. Sto Intermediate Mesh nominal 11.2 oz./yd2 (380 g/m2), high impact, interwoven, open weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials (achieves High Impact Classification).
 - 2. Application: Heavy-duty reinforcing mesh from ground level up to 8'-0" above finish floor elevation for all walls.
- C. Specialty Meshes
 - 1. Sto Detail Mesh nominal 4.2 oz/yd2 (143 g/m2), flexible, symmetrical, interlaced glass fiber fabric, with alkaline resistant coating for compatibility with Sto materials (used for standard back wrapping, aesthetic detailing, and reinforcement of sheathing joints and protection of rough openings with trowel applied air/moisture barrier)

2.09 FINISH COAT

- A. Sto Essence DPR Finish: Acrylic based textured wall finish with graded marble aggregate.
 - 1. Texture: Sto Medium Sand Finish, Sto Swirl Finish, or Sto Fine Sand Finish.
 - a. Match existing hospital building.
 - 2. Color: Match existing hospital building.

2.10 JOB MIXED INGREDIENTS

- A. Portland Cement: Shall be Type I or II, meeting ASTM C150/C150M, white or gray in color, fresh and free of lumps.
- B. Water: Shall be clean and free of foreign matter.

2.11 ACCESSORIES

- A. Starter Track with Weep Holes Rigid PVC (polyvinyl chloride) plastic track Part No. STDE as furnished by Plastic Components, Inc., 9051 NW 97th Terrace, Miami, Florida 33178 (800 327-7077).
- B. Sto-Mesh Corner Bead Standard one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement.
- C. Sto Drip Edge Profile one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return

2.12 MIXING

- A. Sto Gold Fill mix with a clean, rust-free high speed mixer to a uniform consistency
- B. Sto Gold Coat mix with a clean, rust-free high speed mixer to a uniform consistency
- C. Sto Primer/Adhesive-B mix ratio with water: 5-6.5 quarts (4.7-6.2 L) of water per 50 pound (23 kg) bag of Sto Primer/Adhesive-B. Pour water into a clean mixing pail. Add Sto Primer/Adhesive-B, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary by adding up to 12 fl. oz. (0.35L) of water per bag and re-mix to a uniform trowel consistency. Avoid re-tempering. Keep mix ratio consistent. Do not exceed maximum amount of water in mix ratio.
- D. Sto Essence DPR Finish mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.
- E. Mix only as much material as can readily be used
- F. Do not use anti-freeze compounds or other additives

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:
 - 1. Glass Mat Faced gypsum sheathing compliant with ASTM C1177/C1177M
 - 2. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional
 - 3. Fasteners seated flush with sheathing surface and not over-driven
- B. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and the EIFS installation to the Construction Manager. Do not start work until deviations are corrected.

3.02 SURFACE PREPARATION

- A. Remove surface contaminants on gypsum sheathing surfaces.
- B. Remove fasteners that are not anchored into supporting construction and seal holes with air barrier material
- C. Seal over-driven fasteners with air barrier material and install additional fasteners as needed to comply with fastener spacing requirement
- D. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface.
- E. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing

3.03 INSTALLATION - GENERAL

- A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.
 - 1. Where different requirements appear in either document, comply with the most stringent.
 - 2. Neither of these documents supercedes provisions of Contract Documents that defines contractual relationships between parties or scope of this work.

3.04 AIR / MOISTURE BARRIER INSTALLATION

- A. Transition Detailing: Seal substrate transitions and intersections with other materials to form continuous water-resistive barrier on exterior of sheathing, using method recommended by manufacturer.
- B. Rough Opening Protection: At door and window rough openings and other wall penetrations, seal water-resistive barrier and flexible flashings to rough opening before installation of metal flashings, sills, or frames, using method recommended by manufacturer.
 1. Motel Stud Eraming Construction:
 - 1. Metal Stud Framing Construction:

- a. Sto Gold Coat with StoGuard Fabric.
- C. Sheathing Joint Treatment:
 - 1. Sto Gold Coat with StoGuard Fabric.
- D. Air/Moisture Barrier Coating Installation
 - 1. Gypsum Sheathing: Apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform wet mil thickness of 10 mils (Sto Gold Coat). Use 3/4-inch nap roller for gypsum sheathing. Protect from weather until dry.
- E. Air /Moisture Barrier Connections and Shingle Laps
 - 1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
 - 2. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
 - 3. Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air/moisture barrier such that water is directed to the exterior.

3.05 EIFS INSTALLATION

- A. Starter Track:
 - 1. Strike a level line at the base of the wall to mark where the top of the starter track terminates.
 - 2. Attach the starter track even with the line into structural supports with the proper fastener.
 - 3. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS insulation board to be seated inside of track) and abut.
 - 4. Install Starter Track at other EIFS terminations as designated on detail drawings: above roof along dormers or gable end walls, and beneath window sills with concealed flashing.
- B. Detail Splice Strips for Starter Track, Flashing at Floor Lines, Head of Windows and Doors:
 - Install minimum 4 inch (100 mm) wide detail component over back flange of Starter Track, Window/Door Head Flashing, or Floor Line Flashing. Center the detail component so it spans evenly between the back leg of flashing (or accessory) and the coated sheathing. Make a smooth transition to the coated sheathing with a trowel, knife, or roller, depending on the detail component material being used. When Sto Gold Fill with StoGuard Mesh is the detail component apply another coat of the waterproof coating over the detail area. Do not leave detail components exposed for more than 30 days.
- C. Backwrapping
 - Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches (100 mm) of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2.5-inches (64 mm) on the outside surface of the insulation board. Attach mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed. Alternatively, pre-wrap terminating edges of insulation board.
- D. Adhesive Application and Installation of Insulation Board
 - 1. Ensure the air/moisture barrier surface (Sto Gold Coat) is free of surface contamination. Install the insulation board within 30 days of the application of the air/moisture barrier coating (Sto Gold Coat), or clean the surface and recoat with Sto Gold Coat.
 - 2. Rasp the interior lower face of insulation boards to provide a snug friction fit into the Starter Track. (Note: rasping prevents an outward bow at the Starter Track).
 - 3. Use either polyurethane spray foam adhesive (Sto TurboStick) or cementitious adhesive (Sto Primer/Adhesive or Sto Primer/Adhesive-B) per manufacturer's guidelines.

- a. Place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply light pressure when placing the boards. After boards have been in place for 5-10 minutes use a straight edge to lightly press the boards inward and to keep board joints flush, as post expansion of the adhesive may force boards slightly outward.
- 4. Bridge sheathing joints by a minimum of 6 inches (152 mm). Interlock inside and outside corners.
- 5. Butt all board joints tightly together to eliminate any thermal breaks. Care must be taken to prevent any adhesive from getting between the joints of the boards.
- 6. Cut insulation board in an L-shaped pattern to fit around openings. Do not align board joints with corners of openings.
- 7. Check for satisfactory contact of the insulation board with the substrate. If any boards have loose areas use the spray foam adhesive dispensing pistol to create a hole through the board and inject adhesive to attach the loose area. Allow the adhesive to expand to the outer face of the board while withdrawing the pistol. Cut excess adhesive flush with the surface of the insulation. Do not use nails, screws, or any other type of non-thermal mechanical fastener.
- E. Slivering and Rasping of Insulation Board Surface
 - 1. Fill any open joints in the insulation board layer with slivers of insulation or the spray foam adhesive.
 - 2. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.
- F. Trim, Reveals and Projecting Aesthetic Features:
 - Attach features and trim where designated on drawings with adhesive to a base layer of insulation board or to the coated sheathing surface. Fill any gaps between the trim and base layer of insulation with spray foam adhesive and rasp flush with the trim surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).
 - 2. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
 - 3. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.
 - 4. Do not locate reveals/aesthetic grooves at high stress areas.
 - 5. Ensure minimum 3/4-inch (19 mm) thickness of insulation board at the bottom of the reveals/aesthetic grooves.
- G. Completion of Backwrapping
 - 1. Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.
- H. Accessory Installation
 - 1. Corner Bead: cut the corner bead accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the outside corner area that will receive the accessory. Immediately place the accessory directly into the wet base coat material. Do not slide into place. Press the accessory into place. A corner trowel is best for this purpose. Embed and completely cover the mesh and PVC by troweling from the corner to the edge of the mesh so that no mesh or PVC color is visible. Avoid excess build-up of base coat and feather along mesh edges. Adjoin separate pieces by abutting PVC to PVC and overlapping the mesh "tail" from one piece onto the next piece. Fully embed the accessory and mesh "tail" in base coat material. When installing field mesh reinforcement overlap accessory mesh and PVC. Remove any excess base coat from the outside corner.

- 2. Drip Edge: install the drip edge accessory prior to application of field mesh. Install with arrow on mesh pointing UP. Cut the accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the area that will receive the accessory. Immediately place the accessory directly into the wet base coat material and press into place. Do not slide into place. Embed and completely cover the mesh and PVC by troweling from the drip edge screed rail to the edge of the mesh. Avoid excess build-up of base coat, feather along mesh edges, and remove any excess base coat from the drip edge nosing. Abut adjoining pieces and install as described above. When installing field mesh reinforcement overlap accessory mesh 4 inches (10 cm) on both vertical and horizontal faces so the PVC is overlapped, and remove any excess base coat from the drip edge nosing. On vertical and horizontal faces of the accessory install finish to the drip edge lines and remove any protruding finish from the drip edge nosing.
- I. Base Coat and Reinforcing Mesh Application
 - 1. Ensure the insulation board is firmly adhered and free of surface contamination or UV degradation, and is thoroughly rasped before commencing the base coat application.
 - 2. Apply minimum 9x12 inch (225x300 mm) diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.
 - 3. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
 - 4. Ultra-High impact mesh application: Apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.
 - 5. Standard mesh application: Apply base coat over the insulation board, including areas with Ultra-High impact mesh, with a stainless steel trowel to a uniform thickness of approximately ? inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2-1/2 inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 6 inch (152 mm) overlap in each direction (optional if corner bead accessory is used). Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible.
 - 6. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2-inches (51 mm) apply waterproof base coat with a stainless steel trowel to the sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2.5-inches (65 mm).
 - 7. Allow base coat to thoroughly dry before applying primer or finish.
- J. Primer application
 - 1. Ensure the base coat surface is free of surface contamination before commencing the primer application.
 - 2. Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.
- K. Finish Coat Application
 - 1. Ensure the base coat surface or primed base coat is free of surface contamination before commencing the finish application.
 - 2. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spray or stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
 - a. Avoid application in direct sunlight.

- b. Apply finish in a continuous application, and work to an architectural break in the wall.
- c. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results. Cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
- d. Do not install separate batches of finish side-by-side.
- e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
- f. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

3.06 FIELD QUALITY CONTROL

- A. Special Inspections: Developer may engage a qualified special inspector to perform any special inspections required by local jurisdictions:
- B. EIFS Tests and Inspections: For the following:1. According to ICC-ES AC24 or ICC-ES AC235.
- C. Remove and replace EIFS where test results indicate that EIFS does not comply with specified requirements.
- D. Prepare test and inspection reports.

3.07 CLEANING

A. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

3.08 PROTECTION

A. Protect completed work from damage and soiling by subsequent work.

END OF SECTION

SECTION 07 27 26

FLUID-APPLIED VAPOR-PERMEABLE MEMBRANE AIR BARRIERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Fluid-applied, vapor-permeable membrane air barriers for use over glass mat gypsum wall sheathing and other substrates indicated.

1.03 RELATED REQUIREMENTS

- A. Section 06 16 00 Sheathing
- B. Section 07 62 00 Sheet Metal Flashing and Trim
- C. Section 07 92 00 Joint Sealants

1.04 REFERENCES

- A. American Association of Textile Chemists and Colorists (AATCC) Test Method 127. "Water Resistance - Hydrostatic Pressure Test"
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2010 "Energy Standard for Buildings Except Low-Rise Residential Buildings"
- C. ASTM C 920 Standard Specification for Elastomeric Joint Sealants
- D. ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
- E. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modifed Bituminous Sheet Materials Used as Steep slope roofing Underlayment for Ice Dam Protection.
- F. ASTM D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- G. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
- H. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.
- I. ASTM E 331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- J. ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
- K. ASTM E 1105 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
- L. ASTM E 1354 Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
- M. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials
- N. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- O. National Fire Protection Association (NFPA) 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.05 SUBMITTALS

- A. Product Data: Manufacturer's technical data sheets and safety data sheets for product and accessories.
- B. Product certificates.
- C. Product test reports.

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FLUID-APPLIED VAPOR-PERMEABLE MEMBRANE AIR BARRIERS

- D. Shop Drawings:
 - 1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
- E. Free film sample of product at representative cured thickness, minimum 2 inch by 3 inch size.
- F. Sample of sheet detail flashing, minimum 2 inch by 3 inch size.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.
- B. Single-Source Responsibility: Obtain product and accessories from single manufacturer.
- C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs).
- D. Mock-Ups: Prior to installation on Project, apply product and accessories on mock-up to verify details under shop drawing submittals, to demonstrate tie-ins with adjoining construction and other termination conditions and to become familiar with properties of materials in application:
- E. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed product unless it has been inspected, tested and approved.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by manufacturer.
- C. During cold weather, maintain product temperature within acceptable range for application, as required by air barrier manufacturer. Protect freeze-sensitive materials from freezing.

1.08 PROJECT CONDITIONS

- A. Do not apply product or accessories during rain or accumulating snowfall.
- B. Apply product and accessories within approved ambient and substrate temperature range stated in manufacturer's literature.
- C. Do not apply product or accessories over incompatible materials.
- D. Observe safety and environmental measures indicated in manufacturer's SDS, and mandated by federal, state and local regulations.

1.09 WARRANTY

A. The manufacturer shall warrant the product against material defects, or defects in manufacturing for Five (5) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Products from <u>Carlisle Coatings & Waterproofing, Inc</u> are specified to establish a standard of quality for design, function, materials, and appearance.
- B. Other Manufacturers: The following manufacturers are approved to provide materials or products that are equivalent to the "Basis of Design":
 - 1. <u>Grace, W. R., & Co. Conn.</u>; Perm-A-Barrier VP.
 - 2. <u>Henry Company</u>; Air-Bloc 31.
 - 3. Rubber Polymer Corporation, Inc.; Rub-R-Wall Airtight VP.
 - 4. <u>Tremco Incorporated, an RPM company</u>; ExoAir 230.
- C. Substitutions: Equivalent products complying with specified requirements will be considered, provided a manufacturer submit a request for consideration to the Architect prior to date established for receiving bids.

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2.02 VAPOR-PERMEABLE MEMBRANE AIR-BARRIER

- A. General:
 - 1. Air barrier shall be capable of performing as a continuous vapor- permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration.
 - 2. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Performance Requirements:
 - 1. Product shall be minimum 0.013 inch (13mils) dry thickness membrane on exterior sheathing and minimum 0.026 inch (26 mils) dry thickness membrane on concrete and masonry. Dry membrane thickness shall be calculated based on field-measured wet mil thickness using a comb gauge and volume % solids of the product.
 - 2. Product shall be a high-solids, low VOC, moisture-curing material: silane terminated polyether (STPE), polyurethane or silicone chemistry with minimum 80% solids by volume and maximum 100g/L VOC
 - 3. Installed product and accessories shall have an upper service temperature limit of 180°F or higher.
 - 4. Manufacturer shall provide product and accessories which have a minimum installation temperature of 15°F or lower.
 - 5. Performance:
 - a. Air Permeance: ASTM E2178: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference.
 - b. Vapor Permeance: ASTM E96/E96M: Minimum 10 perms (70 g/m2/24h) when tested to water method (B).
 - c. Tensile Strength: ASTM D412:100 lbs/sq. in., minimum.
 - d. Tensile Elongation: ASTM D412: Minimum 200 percent.
 - e. Water Resistance: AATCC Test Method 127: Product over CMU substrate and over gypsum sheathing with joint shall resist a 55 cm (22 inch) column of water for 5 hours, no leaking or wet through.
 - f. Surface Burning: ASTM E84: Flame Spread Index: 25, Smoke Generation Index: 450.

2.03 ACCESSORIES

- A. General: Provide from same manufacturer as air barrier membrane.
- B. Sheet Detail Flashing: Foil composite faced rubberized asphalt flashing, minimum 0.040 inch (40 mils) thickness.
 - 1. Fire-Resist 705 FR-A or Fire-Resist 705 FR-A LT low temperature application formula by Carlisle Coatings & Waterproofing, Incorporated
 - 2. Others as approved by air barrier membrane manufacturer
- C. Contact Adhesive:
 - 1. Carlisle Coatings & Waterproofing, Incorporated:
 - a. Over approved wall substrates: CCW-702 Solvent-Based, CCW-702 LV VOC Compliant Solvent-Based, CCW-702 WB Water-Based, CAV-GRIP™ Aerosol Spray or Travel-Tack portable aerosol spray cans
 - b. Over cured liquid air barrier: CAV-GRIP™ Aerosol Spray or Travel-Tack portable aerosol spray cans
 - 2. Others as approved by air barrier membrane manufacturer
- D. Liquid Detail Flashing. Silane-terminated polyether, minimum 80% solids.
 - 1. Barribond trowel-applied at minimum 40 wet mils thickness
 - 2. Barrithane VP roller or brush-applied at minimum 40 wet mils thickness, all cracks and gaps exceeding 1/16 inch filled with detail sealant or fill compound struck flush.
 - 3. Others as approved by air barrier membrane manufacture

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FLUID-APPLIED VAPOR-PERMEABLE MEMBRANE AIR BARRIERS

- E. Detail Sealant: Silane-terminated polyether, minimum 90% solids, ASTM C 920 Type S, Grade NS, Class 25, Use NT.
 - 1. Barribond by Carlisle Coatings & Waterproofing, Incorporated
 - 2. Others as approved by air barrier membrane manufacturer
- F. Fill Compound: 2-part, non-sag polyurethane sealant
 - 1. Carlisle Coatings & Waterproofing, Incorporated: CCW-201
 - 2. Others as approved by air barrier membrane manufacturer

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions affecting installation of the air & vapor barrier and accessory products for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify that wall assemblies are dried in, such that water intrusion will not occur from above, behind or around the air barrier installation.
- C. Concrete and masonry shall be cured for a minimum of three days. It shall be smooth, with sharp protrusions such as form joints or fins removed and ground flush. Honeycomb and holes/cracks shall be filled with grout or mortar.
- D. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.
- E. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.
- F. Mortar joints shall be struck flush and shall be free of voids. Mortar droppings shall be removed from brick ties and all other surfaces accepting air barrier.
- G. Sheathing boards shall be flush at joints, with gaps between boards according to building code and sheathing manufacturer's requirements. Sheathing boards shall also be securely fastened to the structure with proper fastener type, technique and spacing according to building code and sheathing manufacturer's requirements. Sheathing boards shall be repaired or replaced if inspection reveals moisture damage, mechanical damage or if sheathing boards have exceeded the exposure duration or exposure conditions as required by the sheathing manufacturer.
- H. Plywood, OSB, lumber or pressure-treated wood moisture content, measured with a wood moisture meter in the core of the substrate, shall be below 20%.

3.02 SURFACE PREPARATION

- A. Concrete masonry unit (CMU) wall shall be prepared as follows to accept the air & vapor barrier:
 - 1. Surfaces shall be free of contaminants such as grease, oil and wax on surfaces to receive membrane
 - 2. The CMU surfaces shall be free from projections.
 - 3. Strike all mortar joints flush to the face of the concrete block.
 - 4. Fill all voids and holes with mortar, sealant or other approved fill material.
 - 5. Surface irregularities shall be ground flush or made smooth.
 - 6. Fill around all penetrations with mortar, sealant or other approved fill material and strike flush.
 - 7. If the surfaces cannot be made smooth to the satisfaction of the Architect, it will be the responsibility of the trade to alternatively apply a parge coat (typically one part cement to three parts sand) over the entire surface to receive Air Barrier Membrane
 - 8. Remove mortar droppings on brick ties, shelf angles, brick shelves or other horizontal obstructions.
- B. Cover counter-sunk fasteners and holes through exterior sheathing with fill compound or detail sealant struck flush.
- C. Fill cracks, gaps and joints with fill compound, detail sealant or other material approved by air barrier manufacturer.

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FLUID-APPLIED VAPOR-PERMEABLE MEMBRANE AIR BARRIERS

- D. Fill rough gaps around pipe, conduit and similar penetrations with mortar, non-shrink grout, fill compound or polyurethane foam sealant shaved flush.
- E. Apply a 3/4-inch cant of fill compound or detail sealant at the intersection of the base of the wall and the footing.

3.03 DETAILING

- A. Detailing requires materials and installation at joints, transitions, openings, terminations, penetrations and similar condistions. Perform detailing before or after product installation.
- B. Install product and accessories in details as directed in manufacturer's literature.
- C. Cover sheathing joints with 2" width liquid detail flashing centered over joint:
- D. Sheathing inside and outside corners. Install flashing bearing 3 inches minimum onto either side of angle change. Use either of the following methods:
 - 1. Sheet detail flashing
 - 2. Liquid detail flashing
- E. Window rough openings. Install flashing bearing onto wall 3 inches minimum and returning into opening according to Project drawings. Use either of the following methods:
 - 1. Sheet detail flashing
 - 2. Liquid detail flashing
- F. Pipe or duct penetrations. Install flashing bearing onto wall 3 inches minimum and bearing onto pipe or duct 3 inches, or according to Project drawings. Use either of the following methods:
 - 1. Sheet detail flashing
 - 2. Liquid detail flashing
- G. Expansion or deflection joints: Install sheet detail flashing incorporating bellows or expansion bulb to allow joint movement. Flashing shall bear 3 inches minimum onto either side of joint.
- H. Interface of dissimilar substrates: Install sheet detail flashing, covering transition and bearing 3 inches minimum onto either side of transition.
- I. Prepare all surfaces accepting sheet detail flashing with contact adhesive provided by the same manufacturer. Apply contact adhesive to substrate with sufficient footprint to extend 1 inch beyond edges of sheet detail flashing. Follow contact adhesive application technique and drying time as specified in manufacturer's literature.
- J. Press sheet detail flashing firmly in place with a suitable hand roller tool.
- K. Sheet detail flashings shall be firmly adhered to the substrate, with no wrinkles, fishmouths or bridging at corners. Seal all terminations of sheet detail flashing with a tooled ribbon of detail sealant, centered over termination.
- L. Liquid detail flashings shall be smooth, free of voids and meeting the minimum installation thickness of 40 wet mils.

3.04 INSTALLATION

- A. Apply product and accessories over opaque wall surfaces as indicated in Project drawings.
- B. Apply product by roller, brush or other method as recommended by air barrier manufacturer.
- C. Apply product at specified wet mil thickness in accordance with air barrier manufacturer's requirements.
- D. Verify compliance with air barrier manufacturer's minimum required thickness by documenting product use per area. Perform and document wet mil thickness measurements every 100 square feet, or more frequently if required, to establish uniform and adequate coverage.
- E. Installation shall produce complete coverage of opaque substrates as indicated in Drawings.
- F. Product and accessories shall be fully-adhered to substrates, free of holes, fishmouths, blisters, de-lamination, bridging or inadequate mil thickness. Makes repairs to any of these defects according to air barrier manufacturer's instructions.

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3.05 SCHEDULE WITH RELATED WORK

- A. Related Work shall be sequenced to allow effective installation and inspection of the air barrier.
- B. Finishes, insulation or other layers covering the air barrier shall not be installed until the air barrier installation over that area is complete, has been inspected and is approved to cover.
- C. If the air barrier has been damaged after installation, it shall be repaired according to air barrier manufacturer's instructions before covering.
- D. Penetrations made through the air barrier, such as mechanical/electrical penetrations and fasteners for attaching cladding/insulation, shall be sealed according to the air barrier manufacturer's instructions.
- E. Fenestration shall be sealed to air barrier with sheet detail flashing, silicone sheet, detail sealant, silicone sealant or polyurethane foam sealant according to Project drawings
- F. Through-wall flashing may be installed before or after air barrier. Seal termination of through-wall flashing to air barrier according product manufacturer's instructions.
- G. Wall air barrier shall have a durable, air and watertight seal to the foundation, below-grade waterproofing, roof air barrier, air barrier in neighboring wall assemblies and other conditions as indicated in Project drawings.

3.06 REPAIR AND PROTECTION

- A. Protect air barrier from damage during application and remainder of construction period.
- B. Inspect and make necessary repairs to air barrier before covering. Repair or replace damaged material according to manufacturer's literature.
- C. Air barrier is not designed for permanent exposure. Cover with insulation or exterior cladding as soon as schedule allows.
- D. Outdoor exposure of installed air barrier shall not exceed 180 days.

3.07 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.
- B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements.
- C. Air barriers will be considered defective if they do not pass tests and inspections.
 - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
 - 2. Remove and replace deficient air-barrier components for retesting as specified above.
- D. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

SECTION 07 54 23 TPO SINGLE-PLY ROOFING SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. TPO Thermoplastic Single-Ply Roofing System (Base Bid).

1.02 DESIGN CRITERIA

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. The completed roof system shall meet the following requirements:
 - 1. IBC 2015, Section 1609.
 - 2. ASCE 7, Chapters 26 to 30.
 - 3. External Fire Rating: UL Class A.
- C. Wind Load Design:
 - 1. Risk Category: II.
 - Basic Wind Speed (3-second gust): V(ult) = 115 mph (51 m/s) per Figure 1609.3(1).
 a. Wind speed conversion per Table 1609.3.1: V(asd) = 89 mph (39 m/s)
 - 3. Surface Roughness Category (1609.4.2): B.
 - 4. Exposure Category (1609.4.3): C.
 - 5. <u>ASTM D6630</u>: Design uplift-resistance loads shall have a minimum 2.0 safety factor from the design wind uplift loads determined using ASCE 7.
- D. Wind Uplift Performance: Per IBC 2015, Section 1609.1, wind loads shall be determined in accordance with ASCE 7, Method 1 - Simplified Method. On this basis, the minimum design wind-resistance loads are as follows:
- E. Roof Covering External Fire Resistance Classification: Class A when tested per UL 790.
- F. Thermal Performance: Roof system will achieve a R-value of:
 - 1. Sloped Roof Structure: R-30 (minimum). Refer to the structural drawings for slope provided by the roof framing system.
 - 2. Flat Roof Structure (No Slope) with tapered insulation: R-30 (Average).

1.03 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard 15-year NDL roof warranty, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, and other components of membrane roofing system.
 - 2. Wind Damage Coverage: Winds of 3-second peak gust speeds up to 72 mph, measured at 10-meters above ground using available meteorological data.
 - 3. Hail Damage Coverage: No.
 - 4. Puncture Coverage: No.
- B. Installer's Warranty: Submit roofing Installer's warranty covering Work of this Section, including all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
 - 1. Warranty Period: Two (2) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis of Design Manufacturer: Subject to compliance with the Contract Documents, provide product/s from Carlisle SynTec.

- B. Other Manufacturers: The following manufacturers are approved to provide materials or products that are equivalent to the "Basis of Design":
 - 1. Firestone Building Products Company.
 - 2. GAF Materials Corporation.
 - 3. GenFlex Roofing Systems.
- 4. Johns Manville.
- 2.02 SCOPE / APPLICATION
 - A. Base Bid: TPO Membrane Roofing: One-Ply membrane, fully adhered, over cover board and insulation.
 - 1. Alternate No.1: Refer to Section 07 52 01.

2.03 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: Rigid board with glass fiber reinforced facers (GRF) on both sides, meeting or exceeding the requirements of ASTM C1289, Type II, Class 1, fiber reinforced felt both faces; Grade 2 (20 psi).
 - 1. Basis of Design Product: Carlisle "InsulBase".
 - 2. Application Method: Mechanically Attached.
 - 3. R-Value: 5.7 per inch.
- B. Flat Panel Insulation:
 - 1. Insulation Thickness / R-Value: Provide multiple layer configuration of polyisocyanurate insulation to achieve a minimum R-value of [30], per the 2015 IECC, Table C402.1.3.
 - 2. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain.
 - a. Crickets shall slope 1/4-inch per foot unless otherwise indicated.
- C. Tapered Insulation:
 - 1. Panel Thickness: Panel thickness varies with taper/slope of the panel.
 - a. Provide factory-tapered insulation boards fabricated to slope 1/4-inch per foot towards roof drains. Crickets shall slope 1/4-inch per foot unless otherwise indicated.
 - 2. Insulation Thickness / R-Value: Provide tapered configuration of polyisocyanurate insulation to achieve an average R-value of 30, per the 2015 IECC, Table C402.1.3.
 - 3. Applications:
 - a. Flat roof areas where there is no slope in the roof framing.
 - b. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.04 COVER BOARD

- A. Water-resistant and silicone treated gypsum panel with embedded fiberglass facer on both sides, and pre-primed on one side. GP Gypsum Dens-Deck Prime, distributed by Carlisle.
 - 1. Board Thickness: 1/2 inch (13mm).

2.05 SINGLE-PLY ROOF MEMBRANE:

- A. Basis of Design Product:
 - 1. Carlisle "Sure-Weld" Adhered TPO Roofing System.
- B. Thickness: 60 mils (0.060 inch) (1.5 mm), minimum.
- C. Color: White.
- D. Attachment Method: Adhered.

2.06 FLASHING

- A. Flashing Membrane:
 - 1. Carlisle Sure-Weld TPO Flashing, 60-mils thick.

2.07 ROOF WALKWAYS

- A. Roof Walkways:
 - 1. Thickness: 180 mils.

2. Color: White.

PART 3 EXECUTION

3.01 INSULATION PLACEMENT

A. Secure insulation to the substrate with the required mechanical fasteners in accordance with the manufacturer's current application guidelines.

3.02 COVER BOARD INSTALLATION

A. Comply with membrane roofing system manufacturer's written instructions for installing roof cover board.

3.03 MEMBRANE PLACEMENT AND ATTACHMENT (SURE-WELD FULLY ADHERED)

- A. Apply approved Bonding Adhesive in accordance with the manufacturer's instructions.
- B. Hot-air weld the Sure-Weld membrane sheets in accordance with the manufacturer's hot air welding procedures.

3.04 FLASHING

A. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.05 WALKWAYS

A. Install walkways at all traffic concentration points as identified on the Drawings.

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
- B. Sealants for joints within sheet metal fabrications.
- C. Miscellaneous trim, flashing, closures and accessories.

1.03 RELATED SECTIONS

Section 06 10 00 - Rough Carpentry.

Section 07 72 00 - Roof Accessories.

Section 07 92 00 - Joint Sealants.

1.04 REFERENCE STANDARDS

- A. ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).
- B. CDA A4050 Copper in Architecture Handbook; current edition.
- C. SMACNA (ASMM) Architectural Sheet Metal Manual; 2012.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- B. Samples: Submit two samples 2 by 4 inch (<u>by</u> mm) in size 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.

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 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Products from <u>Berridge Manufacturing Company</u> are specified to establish a standard of quality for design, function, materials, and appearance.
- B. Other Manufacturers: The following manufacturers are approved to provide materials or products that are equivalent to the "Basis of Design":
 - 1. MBCI.
 - 2. AEP Span.
 - 3. CENTRIA Architectural Systems.
 - 4. Fabral.
 - 5. Petersen Aluminum Corporation .
 - 6. Tremco.
 - 7. Pac-Clad.
 - 8. Centria.
 - 9. ATAS International, Inc.

- 10. Metl-Span.
- 11. or approved equal.
- C. Substitutions: 01 25 00 Substitution Procedures.

2.02 SHEET METAL MATERIAL

- A. Pre-Finished Galvanized Steel: Prefinished metal shall be 24-gauge Aluminum-zinc alloy-coated steel sheet, ASTM A792/A792M, with AZ50/AZM150 coating. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - 1. Nominal Thickness: 0.024 inch (24-gauge).
 - 2. Surface: Smooth, flat finish.
 - 3. Exterior Finish: Two-coat fluoropolymer.
 - 4. Strippable film shall be applied to the top side of all prefinished metal to protect the finish during fabrication, shipping and field handling. This strippable film MUST be removed immediately before installation.

2.03 FINISH

- A. Paint Finish:
 - Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70
 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous
 coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.019± 0.0013 mm)
 over 0.2± 0.05 mil (0.05± 0.0013 mm) primer coat, to provide a total dry film thickness of
 0.95± 0.10 mil (0.024± 0.0025 mm). Prepare, pretreat, and apply coating to exposed metal
 surfaces to comply with coating and resin manufacturers' written instructions.

2.04 FABRICATION

- A. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- B. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- E. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- 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 . Return and brake edges.

2.05 GUTTER AND DOWNSPOUT FABRICATION

- A. Gutters: SMACNA (ASMM), Rectangular profile.
- B. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM).
- C. Accessories: Profiled to suit gutters and downspouts.1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
- D. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.
- E. Downspout Boots: Steel.
- F. Downspout Extenders: Same material and finish as downspouts.

G. Seal metal joints.

2.06 ACCESSORIES

- A. Metal Components:
 - 1. Provide accessories and other items essential to a complete roof or wall panel installation including panel clips, trim, closures, fascia, soffits, caps and similar metal components.
 - 2. Metal components fabricated from same gauge and finish as metal panels, unless otherwise noted.
 - 3. Flashing: Provide the same gauge and finish as the exterior panel, unless otherwise noted.
- B. Sealants:
 - 1. Exposed Sealants: One component silicone based as recommended by panel manufacturer: field applied.
 - 2. Concealed Sealants: Non-curing, non-skinning butyl, polyisobutylene or polybutane tape as recommended by panel manufacturer; field applied.
- C. Fasteners:
 - 1. Exposed fasteners shall be hex head self-drilling screws with bonded washers and color to match panels. Screws may be either plated steel or stainless steel as noted on the Drawings.
 - 2. Exposed stainless steel rivets shall match color finish of panel.
- D. Primer: Zinc chromate type.

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.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.03 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Retain subparagraph below if required to prevent galvanic corrosion between graphite and aluminum or aluminum-zinc alloy-coated steel. See the "Metal Considerations" Article in the Evaluations.
 - 8. Do not use graphite pencils to mark metal surfaces.

- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Seal joints as shown and as required for watertight construction.
 - Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.
 - 1. Retain metals in first two subparagraphs below that are specified in Part 2; revise to suit Project. Soldering requires removal of painted, coated, or lacquered finishes. Although unusual, zinc-coated (galvanized) steel, a type of metallic-coated steel, may be soldered.
 - 2. Do not solder metallic-coated steel sheet.
 - 3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.04 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

3.05 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.06 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.07 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.08 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

SECTION 07 72 00 ROOF ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Roof hatches and accessories.
- B. Non-penetrating rooftop assemblies.

1.03 RELATED SECTIONS

- A. Section 05 12 00 Structural Steel Framing
- B. Section 05 51 33 Metal Ladders.
- C. Section 06 10 00 Rough Carpentry.
- D. Section 07 54 23 TPO Single-Ply Roofing System
- E. Section 07 62 00 Sheet Metal Flashing and Trim.

1.04 REFERENCE STANDARDS

- A. 29 CFR 1910.23 Ladders; current edition.
- 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; 2016a.
- 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.

1.05 SUBMITTALS

- A. Submit under the provisions of Section 01 33 00 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.
- C. Shop Drawings: Submit detailed layout developed for this project. Show dimensioned location and number for each type of roof accessory.
 - 1. Non-penetrating Rooftop Supports: Submit design calculations for loadings and spacings.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in producing products similar to those indicated for this Project.
 - 1. Record of successful in-service performance.
 - 2. Sufficient production capacity to produce required units.
- B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing roof accessories to attain designed operational performance.

1.07 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.

1.08 WARRANTY

- A. Roof Hatch, Safety Rail, and Safety Post: Manufacturer's warranty: Materials shall be free of defects in material and workmanship for a period of five (5) years from Date of Substantial Completion.
 - 1. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Roof Hatches:
 - 1. Specified Manufacturer: The Bilco Company
 - a. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - 1) Acudor Products Inc.
 - 2) Babcock-Davis
 - 3) Milcor, Inc.
- B. Non-Penetrating Roof Assemblies:
 - 1. Specified Manufacturer: Portals Plus
 - a. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - 1) PHP Systems Design.
 - 2) Metal Roof Innovations, Ltd.

2.02 ROOF HATCHES

- A. Roof Hatches General:
 - 1. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing.
 - 2. Hardware
 - a. Heavy pintle hinges shall be provided.
 - b. Cover shall be equipped with a spring latch with interior and exterior turn handles.
 - c. Roof hatch shall be equipped with interior and exterior padlock hasps.
 - d. The latch strike shall be a stamped component bolted to the curb assembly.
 - e. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25mm) diameter red vinyl grip handle to permit easy release for closing.
 - f. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
 - g. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- B. Roof Hatch for Ships Ladder Access:
 - 1. Product: Bilco; Type NB-40; Aluminum cover and galvanized steel curb, single leaf roof hatch.
 - 2. Size: 30-inches by 54-inches (762 mm by 1372 mm).
 - 3. Frame/Curb: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 - a. Material: 14 gauge (1.9 mm) paint bond G90 galvanized steel.
 - b. Finish: Factory prime paint.
 - c. Curb Insulation: Manufacturer's standard; 1 inch (25 mm) rigid high-density fiberboard, located on outside face of curb.
 - d. Curb Height: 12 inches (305 mm) from finished surface of roof, minimum.
 - e. Fabrication:
 - 1) The curb shall be formed with a 3-1/2" (89mm) flange with 7/16" (11.1mm) holes provided for securing to the roof deck.

- 2) The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners.
- 4. Cover:
 - a. Material: 11-gauge (2.3 mm) aluminum.
 - b. Finish: Mill finish aluminum.
 - c. Cover Insulation: Shall be fiberglass of 1" (25mm) thickness, fully covered and protected by a metal liner of 18-gauge (1.0 mm) aluminum.
 - d. Fabrication:
 - 1) Provide with a 3-inch (76 mm) beaded flange with formed reinforcing members
 - 2) Gasket: Provide a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- 5. Performance characteristics:
 - a. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m2) with a maximum deflection of 1/150th of the span or 20 psf (97 kg/m2) wind uplift.
 - b. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - c. Operation of the cover shall not be affected by temperature.
 - d. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
- 6. Accessories:
 - a. Safety Railing System as specified below.
 - b. Retractable Safety Post as specified below.
- C. Roof Hatch Accessories:
 - 1. Retractable Safety Post:
 - a. Product: Bilco, Model LU-2; Retractable Safety Post.
 - b. Performance criteria:
 - 1) Tubular post shall lock automatically when fully extended.
 - 2) Safety post shall have controlled upward and downward movement.
 - 3) Release lever shall disengage the post to allow it to be returned to its lowered position.
 - Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14" (356mm) on center and clamp brackets to accommodate ladder rungs up to 1-3/4" (44mm) in diameter.
 - c. Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.
 - d. Material of construction: Steel.
 - e. Balancing spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, easy, controlled operation when raising and lowering the safety post.
 - f. Hardware: All mounting hardware shall be Type 316 stainless steel.
 - g. Factory Finish: Hot-dipped galvanized.
 - 2. Safety Railing System:
 - a. Product: Bilco Company; Bil-Guard 2.0, Model #RL2-XX.
 - b. Performance Characteristics:
 - 1) Comply with 29 CFR 1910.23, with a safety factor of two.
 - 2) Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
 - 3) Hinged gate shall ensure continuous barrier around the roof hatch.
 - 4) Self-closing gate hinge and positive latching system provided with hatch rail system.
 - c. Fabrication:
 - 1) Posts and Rails: Aluminum pipe, 1-1/4 inch diameter, 6061 T6, Schedule 40.
 - 2) Gate: Same material as railing; automatic closing with latch.
 - Gate Hinges and Post Guides: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper aluminum.

- 4) Curb mounting brackets: 6063 T5 aluminum extrusion.
- d. Finish: High-visibility safety yellow powder coat finish.
- e. Hardware: Mounting brackets shall be 3/8" (9mm) thick extruded aluminum. Pivoting post guides with compression fittings and latching mechanism shall be cast aluminum. Self-closing hinges and all fasteners shall be type 316 stainless steel.

2.03 NON-PENETRATING ROOFTOP ASSEMBLIES

- A. Pipe Supports:
 - 1. Product: Portals Plus; Pedestal Plus.
 - a. Description: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly.
 - 2. Design Loadings and Configurations: As required by applicable codes.
 - 3. Height: Provide minimum clearance of 8-inches under supported items to top of roofing.
 - 4. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 5. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - 6. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

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

3.03 INSTALLATION

A. Install roof accessories in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.

3.04 CLEANING

A. Clean installed work to like-new condition.

3.05 PROTECTION

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

SECTION 07 76 00

ROOF DECK PAVERS AND PEDESTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Concrete Roof Pavers.
- B. Pedestal Support System.

1.03 RELATED SECTIONS

A. Section 07 72 73 - Pre-Grown Tray Vegetated Roof System.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

- A. Concrete paver and pedestal support systems are to be placed over roofing/waterproofing systems where indicated. Concrete Paver System to comply with IBC 1504.4 - ANSI/SPRI RP-4 for wind uplift.
- B. Standard Concrete paver with Lok Down System to meet ultimate design wind speed of 140 mph per ASCE 7-05 Section 6.6 Method 3 using full-scale wind tests. Full-scale wind tests comply with IBC 1504.4- ANSI/SPRI RP-4 and IBC 1609.1.1.2. Pedestal components are to meet ASTM D635 burn rate category CC2.

1.05 REFERENCES

- A. Testing Standards
 - 1. ASTM G155-05a Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.
 - 2. ASTM D638-03 Standard Test Method for Tensile Properties of Plastics.
 - 3. ASTM D6110-10 Standard Test Method for Determining the Charpy Impact Resistance of Notched Specimens of Plastics.
 - 4. ASTM D1929-96 Standard Test Method for Determining Ignition Temperature of Plastics.
 - 5. ASTM D2843-99 Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
 - 6. ASTM D635-06 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

1.06 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used, including preparation instructions, installation methods, storage and handling requirements and recommendations.
 - 2. Submit test results for compliance with performance requirements specified herein.
 - 3. Submit written instructions for recommended maintenance.
- C. Shop Drawings:
 - 1. Layout drawings of each paved area showing the pattern of pressed pavers and indicate pavers requiring cutting, Lok Down System, pedestals and waffle reducers if required, drainage patterns, drains, and relationship of paving joints. Include details of specified rigid board insulation, noting all materials and their thickness, and show details at curbs, and vertical surfaces.
 - 2. Details of custom (nonstandard) curbs and stair tread/risers, include methods of installation.
- D. Samples:
 - 1. Submit sample to be selected by Architect from manufacturer's available standard and custom colors.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All products covered under this Section shall be produced by a single manufacturer, unless otherwise specified, with a minimum of fifteen (15) years proven production of this concrete paver product.
 - 1. Lok Down System must provide evidence of completed full-scale wind testing of the system per ASCE 7-05, Section 6.6 Method 3 Wind Tunnel.
- B. Installer Qualifications: Installer shall have a minimum of five (5) years proven specialized construction experience with this product and be capable of estimating and building from blueprint plans and details, in addition to proper material handling.
- C. All work must comply with local, state/provincial licensing and bonding requirements.

1.08 MOCK-UP INSTALLATION

- A. Prior to the start of concrete paver work, construct mock-up of each type of pressed paver size and pattern area for the owner and architect to review. The mock-up will be at the project site or at a location mutually agreed to by the owner and contractor.
- B. Construct the mock-up installation in a minimum 4-foot by 4-foot area of typical concrete units and slabs with all setting beds, joints, edge and curb details as shown on the drawings.
- C. After review of the mock-up, it will be retained and used as a standard of quality for the pressed concrete paver work. At completion of the work, remove the mock-up installations and related materials from the project site. If the mock-ups are incorporated in the actual construction, record their locations and sizes on the actual built record drawings for the project.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Concrete pavers to be banded on pallets and delivered in original unopened packaging with legible manufacturer identification, manufacturing number and manufacture date.
- B. Protect concrete pavers during shipment, storage and construction against damage.

1.10 PROJECT CONDITIONS

A. Do not install products under adverse environmental conditions.

1.11 WARRANTY

Α.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer: Subject to compliance with the Contract Documents, provide product by Tectura Designs (Wausau Tile, Inc.) (P: 800-388-8728 / www.tecturadesigns.com), or an approved equal.
- B. Substitutions: See Section 01 60 00 Product Requirements.
- C. Product: Expressions Series.
- D. Size" 24 inches by 24 inches, nominal.
- E. Thickness: 2 inches.
- F. Color: To be selected from manufacturer's standard Expressions colors.

2.02 CONCRETE ROOF DECK PAVERS

- A. Material Requirements:
 - The concrete paver system shall include the following components:
 - a. Portland Cement: ASTM C150/C150M specifications for Portland Cement.
 - Aggregates: All aggregates are tested in accordance with ASTM C127, ASTM C128 and ASTM C136/C136M specifications. Aggregate shall be blended to meet individual project requirements.
 - (a) Coloring: Pigments used shall be inorganic and alkali resistant and used per manufacturer's recommendations.

1.

- (1) Factory Applied Sealer: Colorless slip and stain resistant penetrating or acrylic sealer.
- B. Performance Requirements:
 - 1. Compressive Strength: (ASTM C140/C140M) The average compressive strength shall not be less than 9,500 psi with no individual unit less than 8,500 psi.
 - 2. Water Absorption: (ASTM C140/C140M) The average shall not be greater than 4 percent.
 - 3. Flexural Strength: (ASTM C-293) Shall not be less than 800 psi.
 - 4. Center Load: (WTCL 99) Pressed paver units shall have a tested center load capacity of 2,000 lbs.
 - 5. Freeze/Thaw: (ASTM C1262) Durability of the pressed paver shall meet the freeze/thaw tests per Section 8, shall have no breakage and not greater than 1 percent loss in dry weight of any individual unit when subject to 100 cycles of freeze/thaw.
 - 6. Static Coefficient of Friction: (ASTM C-1028):
 - a. Wet: > 0.50 and Dry: > 0.60
 - 1) Sizing Dimensions: Shall not differ by more than 1/16 inch (1.6 mm) from width, height, length or thickness. Unit shall conform to a true plane and not differ by more than 1/16 inch (1.6 mm) in either concave and/or convex warpage.

2.03 PEDESTAL SUPPORT SYSTEM AND ACCESSORIES

- A. Terra-Tabs and Shim Plates:
 - 1. The SBR rubber Terra-Tab units provide spacing tabs, 3/16 inch or 1/8 inch, allowing for drainage and air circulation. Terra-Tabs to have a shore hardness of 70, allowing for resiliency without sound transmission. Terra-Tab sizes to correspond with various sizes of pavers.
 - 2. Shim plates are 1/16-inch, 1/8-inch and 1/4-inch thick and of various sizes to correspond with various size Terra-Tabs. Shim Plates to be of the same material as the Terra-Tab.
- B. Pedestal Support Systems:
 - 1. Terra-Stand Pedestals: Accommodates various pitches and height changes of the project area. Unit has outside dimension of 7 inches square and provides surface contact of 49 square inches. Unit adjusts from a minimum of 2-1/2 inches to a maximum of 21 inches and can tilt to a level plane. Units to be high impact copolymer polypropylene. Terra-Tabs are used on top of this unit.
 - a. Lok Down: The Lok Down is made of a high impact copolymer polypropylene. Outside base dimension of 7 inches by 7 inches provides 49 inches square of contact surface. It is installed on previously established grid lines. An average project will require one Lok Down for each Terra Paver.
- C. Waffle Reducer:
 - 1. The Waffle Reducer is made of high impact copolymer polypropylene. Waffle Reducers are made to accommodate height adjustments 1/2 to 3 inches. An outside base diameter of 6 inches provides surface contact of 28 square inches. The unit consists of one base with three pieces of 3/8-inch waffle rings and two pieces of 3/4-inch waffle rings.
- D. Terra Paving Under Edge Restraint System:
 - 1. Edge termination system for mechanical fastening pavers in areas where the maximum wind uplift force occurs on the roof deck. The versatility of this system accommodates complex roof and parapet designs.
- E. Installation Handles:
 - 1. Paver Blok Handles:
 - a. Units to handle paver sizes 12 inches to 24 inches nominal, allowing installing contractor to set units into proper location with 1/8-inch or 3/16-inch joint between units. Also allows for removal and reinstallation units without causing any damage to units or adjacent units, thus allowing inspection of utilities or drains at any time.
 - b. Big Blok Handle:

1) Unit to handle paver sizes 24 inches to 36 inches nominal allowing installing contractor to set units reinstallation without causing any damage to units or adjacent units, thus allowing inspection of utilities or drains at any time.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine all jobsite surfaces to receive the parts of the paving materials. Notify the contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected. Installation of concrete pavers and associated construction constitutes acceptance of the adjacent and underlying construction.
 - 1. Tectura Designs architectural paver.
 - 2. Typical edge condition is 3/16" chamfer.
 - 3. Lok Down System.
 - 4. Terra-Stand Screw Top Pedestal.
 - 5. 60 psi minimum insulation or protection board.
 - 6. Waterproof membrane.
 - 7. Structural Base.
 - 8. Terra Paving under Edge Restraint System.

3.02 INSTALLATION OF LOK DOWN SYSTEM

- A. Install in accordance with Wausau Tile Inc:
- B. Install in accordance with contributing manufacturer's instructions. Installation requirements vary for each individual project site. Pressed pavers used, pattern, grid layout, starting point and finished elevation should be shown on plan view shop drawings which have been prepared and approved by the designer, installing contractor and/or owner.
 - 1. Inspection of deck and fixed elevation locations. All height or location problems to be corrected before installation.
- C. Compare layout of deck to shop drawings or architectural drawings. All variances of field conditions to drawings to be reviewed and corrected prior to starting installation.
- D. Set Terra Stand units or Lok Down Base as a set of grid patterns.
- E. Level surface installation using Terra-Stand screw-top pedestal to follow manufacturer's installation procedures. No variances to system allowed.
- F. Minor height and pitch adjustments to pedestal are handled with 1/16-inch rubber shim plates.
- G. Waffle Reducer unit is used for height adjustments of between 1/2 and 3 inches in 3/8-inch increments.
- H. Set Lok Down base on top of Terra Stand or Waffle Reducer with shim (see Step 6).
- I. Set paver on base of Lok Down. Aligning the knob on base with recess on bottom of paver.
- J. Set top plate on. Aligned flanges on top plate with flanges on bottom plate. (Top cap should fit into recess on top of the paver.)
- K. Place bolt in place and tighten with the bit. Tighten to 70 psi max with torque wrench; do not over tighten. 07 76 00-4, Roof Pavers
- L. Install Terra Paving Under Edge Restraint System and fasten per engineering design.
- M. Placement Tolerance:
 - 1. Maximum of 1/16-inch (1.6 mm) height variation between adjacent pavers.
 - a. Individual pressed pavers shall not vary more than 1/16 inch (1.6 mm) from level across width of the pressed paver.
 - b. Paved areas shall not vary more than 1/4 inch (6 mm) in a distance of 10 feet (3 m) measured at any location and in any direction.
 - c. The surface elevation of pavers shall be 1/8 inch to 1/4 inch (3 mm to 6 mm) above adjacent drainage inlets, concrete collars or channels.
 - d. Joints between pavers to be greater than 1/16 inch (1.6 mm).

3.03 CLEANING AND PROTECTION

- A. Remove and replace pressed pavers which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units with same joint treatment to eliminate evidence of replacement.
- B. Wash entire surface with phosphate free neutral cleaner, rinse with clean water and allow to dry thoroughly.
 - 1. Apply sealer in accordance with manufacturer's directions.
- C. Penetrating or topical type sealer designed especially for pressed concrete pavers.

SECTION 07 81 00 APPLIED FIREPROOFING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Section includes sprayed fire-resistive materials (SFRM).

1.03 RELATED REQUIREMENTS

- A. Section 05 12 00 Structural Steel Framing
- B. Section 05 21 00 Steel Joist Framing
- C. Section 05 31 00 Steel Decking
- D. Section 07 05 53 Fire and Smoke Assembly Documentation
- E. Section 07 81 23 Intumescent Fire-Resistive Materials
- F. Section 07 84 00 Penetration Firestopping

1.04 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Framing plans, schedules, or both, indicating the following:
 - 1. Extent of fireproofing for each construction and fire-resistance rating.
 - 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
 - 4. Treatment of fireproofing after application.
- C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard dimensions in size.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For each type of fireproofing.
- C. Evaluation Reports: For fireproofing, from ICC-ES.
- D. Preconstruction Test Reports: For fireproofing.
- E. Field quality-control reports.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
- B. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.
 - 1. Build mockup of each type of fireproofing and different substrate as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups of fireproofing.
 - 1. Provide test specimens and assemblies representative of proposed materials and construction.
- B. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
 - 1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E 736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 2. Density: Test for density according to ASTM E 605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with fireproofing.
 - 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 5. For materials failing tests, obtain applied-fireproofing manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.09 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is below 40 degrees F (4 degrees C) unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
 - 1. Primary structural frame (i.e. columns, beams/girders connected to columns, braces), 3 Hours: UL X790.
 - 2. Floor beams & associated secondary members, 2 Hours: UL N759
 - 3. Roof construction & associated secondary members, 1 1/2 Hours: UL D756.
- B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction and the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
 - 4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
- E. Asbestos: Provide products containing no detectable asbestos.

2.02 SPRAYED FIRE-RESISTIVE MATERIALS

- A. SFRM: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Isolatek International; Cafco 300 or Cafco 400.
 - b. GCP Applied Technologies; MK-5
 - 2. Applications:
 - a. For Interior Applications; Concealed.
 - b. For Interior Applications; Exposed to View and Away from Damage.
 - 3. Bond Strength: Minimum 150-lbf/sq. ft. (7.18-kPa) cohesive and adhesive strength based on field testing according to ASTM E736.
 - 4. Density: Not less than 15 lb/cu. ft. as specified in the approved fire-resistance design, according to ASTM E605/E605M.
 - 5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375-inches.
 - 6. Combustion Characteristics: ASTM E136
 - Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 a. Flame-Spread Index: 10 or less.
 - b. Smoke-Developed Index: 10 or less.
 - 8. Compressive Strength: Minimum 10 lbf/sq. in. (68.9 kPa) according to ASTM E760/E760M.
 - 9. Corrosion Resistance: No evidence of corrosion according to ASTM E937/E937M.
 - 10. Deflection: No cracking, spalling, or delamination according to ASTM E759/E759M.
 - 11. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
 - 12. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours according to ASTM E859/E859M.
 - 13. Fungal Resistance: No growth after 28 days when tested according to ASTM G21.
 - 14. Finish: Spray-textured finish.
 - a. Color: As indicated by manufacturer's designations.

2.03 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:
 - 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E736.
- C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fireproofing manufacturer's written

recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.

- 1. Minimum weight of 1.7 psf (8 kg/sq m), galvanized finish.
- E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
- F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.
- G. Water: Clean, potable.
- H. Overcoat: As recommended by manufacturer of applied fireproofing material.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:
 - 1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
 - 2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
- B. Verify that concrete work on steel deck has been completed before beginning fireproofing work.
- C. Verify that roof construction, installation of roof-top HVAC equipment, and other related work is complete before beginning fireproofing work.
- D. Conduct tests according to fireproofing manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.
- E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.
- B. Clean substrates of substances that could impair bond of fireproofing.
- C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.
- D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.03 APPLICATION

- A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable

to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

- C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
 - 1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
- D. Metal Decks:
 - 1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, has been completed.
 - 2. Do not apply fireproofing to underside of metal roof deck until roofing has been completed; prohibit roof traffic during application and drying of fireproofing.
- E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
- F. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
- G. Extend fireproofing in full thickness over entire area of each substrate to be protected.
- H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
- I. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fireproofing that differs in color from that of encapsulant over which it is applied.
- J. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.
- K. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
- L. Cure fireproofing according to fireproofing manufacturer's written recommendations.
- M. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- N. Finishes: Where indicated, apply fireproofing to produce the following finishes:1. Spray-Textured Finish: Finish left as spray applied with no further treatment.

3.04 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Test and inspect as required by the applicable chapter of current adopted IBC.
- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Fireproofing will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
 - 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

3.05 CLEANING, PROTECTING, AND REPAIRING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.
- C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.
- D. Repair fireproofing damaged by other work before concealing it with other construction.
- E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

SECTION 07 81 28

FIRE-PROTECTIVE INTUMESCENT THERMAL BARRIERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Surface preparation and application of fire-protective intumescent thermal barrier coating to spray- applied polyurethane foams.

1.03 RELATED SECTIONS

A. Section 07 21 29 - Foamed-In-Place Insulation.

1.04 REFERENCE STANDARDS

 ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

1.05 DEFINITIONS

- A. WFT: Wet Film Thickness.
- B. DFT: Dry Film Thickness.

1.06 SUBMITTALS

- A. Submit in compliance with Section 01 33 00 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. Samples: Submit samples for each type of coating system and each color of intumescent thermal barrier coating indicated. Submit Samples on rigid backing, not less than 200 mm (8 inches) square. Provide step coats on samples to show each coat required for system.
- D. Evaluation reports: Submit Evaluation reports in accordance with ICC-ESR 3702 showing compliance with applicable building codes.
 - 1. Submit Evaluation report from accredited independent evaluation agency, indicating compliance of intumescent thermal barrier with specifications for specified performance characteristics and physical properties.
- E. Certificates: Certify that intumescent fireproofing provided for this project meets or exceeds specified requirements in all respects.
- F. Applicator's Field Reports: Submit applicator's job work written reports that includes information about ambient conditions, application thicknesses and results of on-site testing to verify compliance of Work, as described in this Section.
- G. Operation and Maintenance Data: Submit operation and maintenance data for intumescent coatings work for inclusion in operation and maintenance manuals specified in Division 01.

1.07 QUALITY ASSURANCE

- A. Provide materials and construction for hourly ratings listed in the Underwriters Laboratories, Inc. Fire Resistance Directory or as calculated by the American Iron and Steel Institute formula.
- B. Manufacturer Qualifications: Company that specializes in manufacturing the type of products specified, with minimum of ten years of documented experience.
 - 1. Manufacturer shall have a program of continuous quality management implemented conforming to the requirements of ISO 9001. Submit proof of certification upon request.

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- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.
- D. Mock-ups
 - 1. Construct mock-ups in accordance with requirements of Division 01 to verify selections made under sample submittals, and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 2. Apply mock-up of intumescent coating work, illustrating assembly including substrate preparation and quality of workmanship in presence of Architect and Owner.
 - 3. Mock-ups shall be used as a benchmark for judging the texture and thickness of the finished work. Mock-ups may form part of the completed Work if undisturbed at the time of substantial completion.
- E. Source Limitations: Obtain each coating system from single source from single manufacturer or provide a system approved in writing by intumescent thermal barrier coating manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project in manufacturer's unopened packages, fully identified as to trade name, type and other identifying data.
- B. Packaged materials shall bear the appropriate labels, seals and WHI and/or UL label (mark) for fire resistive ratings and shall be stored at temperatures in compliance with manufacturer instructions in a dry interior location away from direct sunlight.
- C. Ensure materials are not subjected to freezing temperatures.
- D. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained in accordance with manufacturer's recommendations, but not less than 50 deg F.

1.09 PROJECT CONDITIONS

- A. Ensure minimum substrate temperature and ambient temperature of 50 deg F is maintained prior to, during, and a minimum of 72 hours after application.
- B. Provide temporary enclosures and heat to maintain proper temperatures and humidity levels in application areas. Responsibility for provision of such temporary enclosures and heat shall be General Contractor's unless noted otherwise.
- C. Ensure ventilation of not less than 0.3 complete air exchanges per hour is maintained until materials are cured.
- D. Ensure relative humidity does not exceed 85% throughout application and curing period of materials. Provide compatible bonding primer and protective topcoats when Products are installed in areas of high humidity
- E. Do not apply products in snow, rain, fog, or mist, or to damp or wet surfaces.
- F. Allow wet surfaces to dry thoroughly and to attain temperature and conditions specified before starting or continuing coating operation.

1.10 WARRANTY

Α.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Products from <u>International Fireproof Technology, Inc</u> (P: 949-975-8588 / Web: www.painttoprotect.com) are specified to establish a standard of quality for design, function, materials, and appearance.
- B. Substitutions: See Section 01 25 00 Substitution Procedures.

2.02 DESIGN AND PERFORMANCE REQUIREMENTS

- A. Intumescent fire-resistive material: Provide intumescent thin-film fire resistive coating systems tested by an independent testing agency in accordance with ASTM E119 and acceptable to authorities having jurisdiction (AHJ).
 - 1. Provide assemblies listed by UL or FM and bearing listing agency label or mark.
- B. Material Compatibility:
 - 1. Provide materials for use within each coating system that are compatible with one another and substrates indicated.
 - 2. Apply all products according to spreading rates recommended in writing by intumescent thermal barrier coating manufacturer.
 - 3. Comply with requirements for fire-protective coating classification and surface-burning characteristics indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

2.03 INTUMESCENT THERMAL BARRIER COATING SYSTEM

- A. Bonding Primer (where required): Interior unconditioned spaces subject to freeze thaw cycling, temperature and humidity variations or as required per tested and listed system. Waterborne, acrylic emulsion, adhesion- promoting bonding primer recommended in writing by manufacturer, if required, compatible with substrate and other materials indicated.
 - 1. Application thickness (WFT): not less than 3 mils, and not more than 5 mils.
 - 2. Acceptable product: "DTM Bonding Primer" by Sherwin Williams or approved equivalent recommended in writing by intumescent thermal barrier manufacturer.
- B. Fire-protective Intumescent Thermal Barrier Coating:
 - 1. Basis of Design Product: International Fireproof Technology; "DC-315".
 - 2. Protective coating with following characteristics, specifically formulated for application over polyurethane foam plastics and compatible with insulation:
 - a. Finish: Flat
 - b. Color: Ice Grey.
 - c. VOC Content: 47g/L
 - d. Shore D Hardness (before topcoat and finish coat are applied): 40.
 - e. Solids by Volume: 67%
 - f. Specific Gravity: 1.30 +/- 0.05 g/cc
 - g. Drying Time @ 25 deg C (77 deg F) and 50% R.H:
 - 1) To touch: 1-2 hours
 - 2) To recoat (if required): 2-4 hours
 - h. Flashpoint: None
 - i. Reducing or Cleaning: Water

2.04 ACCESSORIES

A. Provide accessories to comply with manufacturer's recommendations and to meet fire resistance design and code requirements. Such accessories include, but are not limited to, any required or optional items such as bonding agents, mechanical attachments; and application aids.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify suitability of substrates, including surface conditions, and compatibility with existing finishes and primers.
- B. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

3.02 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and coating systems indicated. Refer to test report for applicable brand and type of sprayed polyurethane foam to

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FIRE-PROTECTIVE INTUMESCENT THERMAL BARRIERS verify compatibility, and if a primer is required. Provide compatible primer approved by intumescent thermal barrier manufacturer to required surfaces where required by applicable test reports.

- B. Provide masking, drop cloths or other suitable coverings to prevent overspray onto surfaces not intended to be coated with intumescent coating.
- C. Ensure substrates are clean, and free of substances, including dirt, oil, grease, loose materials and incompatible that could impair bond of coatings.
- D. Do not coat surfaces if surface moisture content or alkalinity exceeds that permitted in manufacturer's written instructions.
- E. Remove incompatible primers, and reprime substrate with compatible primers as required to produce coating systems indicated.
- F. Prime or "fog" glossy foam surfaces prior to applying intumescent thermal barriers.

3.03 APPLICATION

- A. Apply intumescent thermal barrier coatings according to manufacturer's written instructions and to comply with requirements for fire-protective coating classification and applicable test reports for spay urethane foam insulation.
- B. Use airless spray equipment and techniques best suited for substrate, and in accordance with requirements indicated in manufacturer's instruction guidelines.
- C. Apply each coat separately according to manufacturer's written instructions.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections.

3.04 CLEANING AND PROTECTION

- A. Upon completion of installation, clean excess material, overspray, and debris. Remove and clear such materials from Project site.
- B. Ensure patching of, and repair to, intumescent thermal barriers due to damage by other trades, is performed under this section, and paid for by trade responsible for damage.
- C. Ensure patching is performed by an applicator with expertise in the installation of intumescent thermal barrier coatings.

3.05 FIELD QUALITY CONTROL

- A. Continuously monitor WFT by performing checks to ensure correct thicknesses are applied.
- B. Measuring Thickness:
 - 1. Install medallions prior to applying the intumescent thermal barrier coating as a means of measuring wet film thickness and dry film thickness, or;
 - 2. Perform thickness measurements by measuring representative sample of installed intumescent coating material by means of calipers, optical comparators or similar devices.

3.06 IDENTIFICATION

A. Upon completion, provide job site label or similar method of identifying product used. Affix job site label in a prominent location, clearly indicating applicator's name, contact information, company information, products used, and measured thickness.

SECTION 07 84 00

PENETRATION FIRESTOPPING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Penetrations in fire-resistance-rated walls.
- B. Penetrations in horizontal assemblies.
- C. Penetrations in smoke barriers.

1.03 RELATED SECTIONS

Section 07 92 00 - Joint Sealants

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
 - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
 - 3) FM Global in its "Building Materials Approval Guide."

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.08 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, available products that may be incorporated into the Work include, but are not limited to, the following manufacturers:
 - 1. Specified Technologies Inc.
 - 2. Hilti, Inc.
 - 3. 3M Fire Protection Products.
- B. Substitutions: Section 01 25 00 Substitution Procedures.

2.02 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - 1. Fire-resistance-rated walls include fire-barrier walls and smoke-barrier walls.
 - 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - 1. Horizontal assemblies include floors and floor/ceiling assemblies.
 - 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 - 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.
- E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- G. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

- 1. Sealants: 250 g/L.
- 2. Sealant Primers for Nonporous Substrates: 250 g/L.
- 3. Sealant Primers for Porous Substrates: 775 g/L.
- H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.03 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multi-component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and non-sag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of non-sag grade for both opening conditions.

2.04 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other

items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.05 MATERIALS

- A. General: Use only through-penetration firestop system products that have been tested for specific fire-resistance-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Latex Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSS Intumescent Sealant
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series LCI Intumescent Sealant
 - 3. Specified Technologies, Inc. (STI) SpecSeal Series LC Endothermic Sealant
 - 4. Specified Technologies, Inc. (STI) SpecSeal Series AS Elastomeric Spray
 - 5. Products equal to above as manufactured by Hilti or 3M Fire Protection Products.
- C. Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSC Firestop Collars
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series LCC Firestop Collars
 - 3. Products equal to above as manufactured by Hilti or 3M Fire Protection Products.
- D. Wall Opening Protective Materials: Intumescent, non-curing pads or inserts for protection of electrical switch and receptacle boxes to reduce horizontal separation to less than 24", the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSP Firestop Putty Pads
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series EP PowerShield Insert Pads
 - 3. Products equal to above as manufactured by Hilti or 3M Fire Protection Products.
- E. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSP Firestop Putty
- F. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series RED Wrap Strip
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series BLU Wrap Strip
 - 3. Products equal to above as manufactured by Hilti or 3M Fire Protection Products.
- G. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSB Firestop Pillows
 - 2. Products equal to above as manufactured by Hilti or 3M Fire Protection Products.
- H. Mortar: Portland cement based dry-mix product formulated for mixing with water at Project site to form a non-shrinking, water-resistant, homogenous mortar, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series SSM Firestop Mortar
 - 2. Products equal to above as manufactured by Hilti or 3M Fire Protection Products.
- I. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag), the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) Pensil 300 Silicone Sealant
 - 2. Specified Technologies, Inc. (STI) Pensil 300 SL Self-Leveling Silicone Sealant
 - 3. Products equal to above as manufactured by Hilti or 3M Fire Protection Products.
- J. Silicone Foam: Multicomponent, silicone-based liquid elastomers, that when mixed, expand and cure in place to produce a flexible, non-shrinking foam, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) Pensil 200 Silicone Foam

2. Products equal to above as manufactured by Hilti or 3M Fire Protection Products.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.03 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

- A. Identify penetration firestopping with preprinted bar-coded, metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning Penetration Firestopping Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency with penetration test number.
 - 4. Date of installation.
 - 5. Manufacturer's name.

- 6. Installer's name.
- B. Identify all fire walls, fire barriers, fire partitions smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations with permanent signs or stenciling. Such identification shall:
 - 1. Be located in accessible concealed floor, floor-ceiling or attic spaces;
 - 2. Be located 15 feet (4.572 m) of the end of each wall and at intervals not exceeding 30 feet (9.144 m) measured horizontally along the wall or partition; and
 - 3. Include lettering not less than 3 inches (76 mm) in height with minimum 3/8 inch (9.5 mm) stroke in a contrasting color incorporating the type of wall and/or partition followed by the phrase, "-PROTECT ALL OPENINGS."

3.05 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

SECTION 07 92 00 JOINT SEALANTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Silicone joint sealants.
- B. Urethane joint sealants.
- C. Polyurea joint sealants.
- D. Latex joint sealants.
- E. Acoustical joint sealants.
- F. Security (tamper-resistant) joint sealants.

1.03 RELATED SECTIONS

Section 03 30 00 - Cast-in-Place Concrete

Section 04 20 00 - Unit Masonry

Section 06 61 16 - Solid Surface Fabrication

Section 09 21 16 - Gypsum Board Assemblies

Section 09 30 00 - Tiling

Divisions 21, 22, 23, 26, 27 specifications regarding building service systems that penetrate walls, floors, and ceilings.

Seal interior penetration openings in a manner that prevents transmission of airborne noise and structural vibration into acoustically sensitive/critical spaces. Penetrations shall include conduit, duct, pipe, cable, recessed boxes, and other penetrants, assemblies, or devices noted in the Documents.

1.04 REFERENCE STANDARDS:

- A. ASTM C510 Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealant, 1990.
- B. ASTM C639 Test Method for Rheological (Flow) Properties of Elastomeric Sealants, 1990.
- C. ASTM C719 Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement, 1993.
- D. ASTM C834 Standard Specification for Latex Sealants.
- E. ASTM C919 Standard Practice for Use of Sealants in Acoustical Applications.
- F. ASTM C920 Standard Specification for Elastomeric Joint Sealants.
- G. ASTM C1021 Standard Practice for Laboratories Engaged in Testing of Building Sealants.
- H. ASTM C1193 Standard Guide for Use of Joint Sealants.
- I. ASTM C1248 Standard Test Method for Staining of Porous Substrate by Joint Sealants.
- J. ASTM C1330 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
- K. ASTM D412. Test Method for Vulcanized Rubber and Thermo-Plastic Rubbers and Thermo-Plastic Elastomers/Tensions.
- L. ASTM D2240. Test Method for Rubber Property- Durometer Hardness.
- M. ASTM E90 -

N. American Association of State Highway and Transportation Officials (AASHTO), Standard Specifications for Highway Bridges, Thirteenth Edition, 1992. See Table 25.2B for physical property requirements of bridge bearing quality neoprene.

1.05 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- D. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- E. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- F. Field-Adhesion Test Reports: For each sealant application tested.
- G. Warranties: Sample of special warranties.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Preinstallation Conference: Conduct conference at Project site.

1.08 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
1.09 WARRANTY

- A. Installation Warranty: The Installer shall warrant the products to be free of defects in material and workmanship for a period of two (2) years from Date of Substantial Completion.
- B. Manufacturer Warranty: The Manufacturer shall warrant the products against material defects, or defects in manufacturing, for a period of five (5) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Multiple manufacturer's specified.
 - 1. Products of the manufacturer's listed below will be accepted. Additional manufacturers will be considered in accordance with the "or equal" provision specified in Section 01 60 00 Product Requirements.
 - a. Dow Corning Corporation.
 - b. GE Advanced Materials.
 - c. Tremco Incorporated.
 - d. Pecora Corporation.
 - e. BASF Building Systems.
 - f. Surebond.
 - g. GE Advanced Materials.
 - h. Sika Flex.
- B. Substitutions: Submit a request for substitution for any manufacturer not named, as specified in Section 01 25 00 Substitution Procedures.
- C. Substitutions: 01 25 00 Substitution Procedures.

2.02 MATERIALS, GENERAL

- 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 joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - Basis-of-Design Manufacturer/Products: Subject to compliance with the Contract Documents, available products that may be incorporated into the Work include, but are not limited to, the following manufacturers: Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.03 SILICONE JOINT SEALANTS

- A. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Basis-of-Design Manufacturer/Product:
 - a. Dow Corning Corporation; 995 Silicone Structural Sealant.
 - b. GE Advanced Materials Silicones; Sanitary SCS1700.

- c. Tremco Incorporated; Tremsil 200 Sanitary.
- d. Pecora Corporation; Pecora 898 NST
- B. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, for Use NT.
 - 1. Basis-of-Design Manufacturer/Products:
 - a. <u>BASF Building Systems;</u> MasterSeal NP 1.
 - b. Dow Corning Corporation; 795.
 - c. <u>GE Advanced Materials</u>; SilPruf.
 - d. Pecora Corporation; Pecora 890 NST, 890FTS (Field Tintable).
 - e. <u>Tremco Incorporated;</u> Spectrem 3.

2.04 URETHANE JOINT SEALANTS

- A. Multi-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C920, Type M, Grade P, Class 25, for Use T.
 - 1. Basis-of-Design Manufacturer/Products:
 - a. BASF Building Systems; MasterSeal SL 2.
 - b. Pecora Corporation; Dynatrol II.
 - c. Tremco Incorporated; Vulkem 245.
 - d. SikaFlex 2c SL
 - e. Sherwin Williams Loxon 2K SL
- B. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C920, Type M, Grade NS, Class 50, for Use NT.
 - 1. Basis-of-Design Manufacturer/Products:
 - a. BASF Building Systems; MasterSeal NP 2.
 - b. Pecora Corporation; Dynaflex.
 - c. Tremco Incorporated; Dymeric 240.
 - d. SikaFlex 2c NC
 - e. Sherwin Williams Loxon 2K NS

2.05 POLYUREA SEALANTS

- A. Semi-Rigid, Multi-Component Polyurea Sealant: Self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with a Shore D 85 or higher hardness when tested in accordance with ASTM D2240. Tensile strength of 1160 pounds per squate inch when tested in accordance with ASTM D412.
 - 1. Basis-of-Design Manufacturer/Products:
 - a. VersaFlex Incorporated; S/L 85.
 - b. L & M Construction Chemicals, Inc.; Joint Tite 750.

2.06 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
 - 1. Basis-of-Design Manufacturer/Products:
 - a. Pecora Corporation; AC-20+.
 - b. Tremco Incorporated; Tremflex 834.

2.07 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
- B. Properties: Acoustical sealants shall have the following properties:
 - 1. Hardness of no more than 50 durometer Shore A as rated in ASTM D2240.
 - 2. Minimum elongation of 500% as rated in ASTM D412.
 - 3. Minimum joint width movement of 25% as rated in ASTM C719.
 - 4. Self Leveling type (S/L) if applied on floors in accordance with ASTM C639.
 - 5. Non-Sag type (N/S) if applied on walls in accordance with <u>ASTM C639</u>.

- 6. Acoustical sealants must meet the following additional requirements where applied in exposed locations:
 - a. Acoustical sealants shall be paintable.
 - b. Acoustical sealants shall be skinning type.
 - c. Acoustical sealants shall be non-staining type as rated in ASTM C510.
- C. For concealed locations, acoustical sealants shall be one of the following approved products. Substitutions are unacceptable unless otherwise approved by the Architect and project Acoustics Consultant.
 - 1. Acoustic Surfaces, AS-29
 - 2. GE SilPruf SCS2000
 - 3. PTI Architectural Sealant 707
- D. For exposed locations, acoustical sealants shall be one of the following approved products. Substitutions are unacceptable unless otherwise approved by the Architect and project Acoustics Consultant.
 - 1. DAP Dynaflex 2
 - 2. GE SCS7000
 - 3. Sikaflex 1a
- E. For fire-rated locations, acoustical sealants shall be one of the following approved products. Substitutions are unacceptable unless otherwise approved by the Architect and project Acoustics Consultant.
 - 1. HILTI CP 601S
 - 2. STI Spec Seal PEN300
 - 3. Tremco Fyre-Sil
 - 4. Johns Manville Firetemp CI

2.08 PUTTY PADS

- A. Putty pads shall be made from polybutene-butyl with inert fillers or other approved permanently resilient self-adhering material.
- B. Putty pads shall have a minimum thickness of 1/8-inch.
- C. For non-rated locations, putty pads shall be the following approved product. Substitutions are unacceptable unless otherwise approved by the Architect and project Acoustics Consultant.
 - 1. Harry A. Lowry & Associates Outlet Box Pads
- D. Basis-of-Design Manufacturer/Products:
 - 1. Hevi-Duty Nelson FSP Putty Pads
 - 2. STI Spec Seal SSP Putty Pads
 - 3. 3M Fire Barrier Putty Pads
 - 4. Substitutions are unacceptable unless otherwise approved by the Architect and project Acoustics Consultant.

2.09 PACKING MATERIAL

- A. Packing material shall be of the following types:
 - 1. Mineral Fiber
 - 2. Glass Fiber
 - 3. Preformed Pipe Insulation
 - 4. Others as approved by the acoustical sealant manufacturer and project Acoustics Consultant.

2.10 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.11 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of** sealant to joint substrates indicated.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 EXTENT

- A. Resiliently seal all penetrations (conduit, ducts, pipes, cables, recessed boxes, etc.) using acoustical sealant and/or putty pads through all walls, floors, and ceilings of the following spaces:
 - 1. As noted on the Penetration Control drawings.
 - 2. Mechanical, electrical, and elevator equipment rooms.
 - 3. Rooms containing motorized theatrical equipment, sound racks, dimmer racks, or any other equipment that contains a transformer, fan, or motor.
- B. At double-wall or triple-wall partitions, resiliently seal penetrations at each wall.
- C. If the Contract Documents seem unclear, request clarification of extent from the Architect.

3.03 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal
 - b. Glass
 - c. Porcelain enamel
 - d. Glazed surfaces of glass tile

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.04 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written recommendations.

3.05 ACOUSTICAL SEALANTS

- A. Opening Requirements
 - 1. In metal stud assemblies, each penetrant must be housed in an individual opening properly sized for that penetrant. Routing multiple penetrants through a single opening is not allowed. The following requirements apply:

- a. Provide a minimum of 2x wood blocking or 2 layers of 3/4" plywood spanning between studs for pipe, conduit, cable, and round duct penetrants to form the opening without the use of a sheetmetal sleeve.
- b. Frame openings for rectangular duct penetrants without the use of a sheetmetal sleeve.
- c. The space between the opening and the penetrant shall be 1/2-inch minimum to 3/4-inch maximum around the penetrant. The penetrant shall be centered within the opening to prevent contact between the opening and the penetrant.
- 2. In masonry or precast concrete assemblies, each penetrant must be housed in an individual opening properly sized for that penetrant. Routing multiple penetrants through a single opening is not allowed. The following requirements apply:
 - a. At masonry assemblies, properly form openings to minimize the grout needed between the opening and the sleeve.
 - b. Provide sleeves that are grouted in place. Sleeve ends shall be flush with surrounding substrates. Provide infill around all sleeves with material of surface weight equal to or greater than the surrounding substrate. All void spaces between sleeve and masonry or precast concrete must be filled airtight.
 - c. In grout-filled masonry or precast concrete, properly sized core drilled holes may be used in lieu of sleeves.
 - d. The space between the sleeve and the penetrant shall be 1/2-inch minimum to 3/4-inch maximum around the penetrant. The penetrant shall be centered within the opening to prevent contact between the sleeve and the penetrant.
 - e. At multi-wythe partitions, provide separate sleeves at each wythe. Sleeves may not bridge airspace(s) of multi-wythe partitions.
- 3. In poured concrete assemblies, penetrants can be housed in an individual opening properly sized for that penetrant or housed in an opening properly sized for several penetrants. When multiple penetrants are housed in a single opening, the following requirements apply:
 - a. Each penetrant must be sleeved.
 - b. Sleeve ends shall be flush with surrounding substrates. Provide infill around all sleeves with material of surface weight equal to or greater than the surrounding substrate. All void spaces between sleeves and concrete must be filled airtight.
 - c. The space between the sleeve and the penetrant shall be 1/2-inch minimum to 3/4-inch maximum around the penetrant. The penetrant shall be centered within the opening to prevent contact between the sleeve and the penetrant.
 - d. At multi-wythe partitions, provide separate sleeves at each wythe. Sleeves may not bridge airspace(s) of multi-wythe partitions.
- B. Clearances
 - 1. Maintain a 4-inch minimum clear space around duct penetrations so that an airtight seal can be easily installed without conflicts from nearby penetrants, floors, ceilings, walls, or other obstructions.
 - 2. Maintain a 2-inch minimum clear space around all other penetrations so that an airtight seal can be easily installed without conflicts from nearby penetrants, floors, ceilings, walls, or other obstructions.
- C. Sealing
 - 1. Do not proceed with installation if opening requirements or other requirements specified herein are not met. Conditions shall be corrected to meet the requirements of this Specification before sealant is installed.
 - 2. Prepare and install backer rod material in accordance with manufacturer's recommendations for proper application of sealant.
 - 3. Loosely fill space between opening or sleeve and penetrant with clean packing material to be nearly flush with both ends of opening or sleeve.
 - 4. Seal both ends of penetration with liberal bead of sealant applied continuously around the penetration and jointed end-to-end to form an airtight, continuous membrane.
 - a. Sealant shall completely fill the space surrounding the penetrant.

- b. Sealant thickness shall be as recommended by the manufacturer, no less than 1/4-inch.
- 5. When complete, sealant shall be flush with surrounding substrate.

3.06 PUTTY PADS

- A. Brush or wipe construction dust and dirt from recessed box.
 1. If surface is contaminated with oil, wipe with xylene or toloulene to remove oily residue.
- B. Before mounting recessed box or attaching conduit, adhere putty pad to box back and mounting side(s). Leave 1/2-inch minimum overlap along the front surface to enable wrapping of plaster ring.
- C. Mount recessed box and install plaster ring. Tighten all loose fasteners.
- D. Continue wrapping recessed box, all conduit attachments and plaster ring with putty pad. Press putty pad firmly into surfaces.
 - 1. If necessary, cut and apply additional pieces of putty pad to achieve an airtight seal around the recessed box, conduit attachments, and plaster ring.
- E. After gypsum board installation, press putty pad firmly against gypsum board to create an airtight seal.
 - 1. If airtight seal is not continuous around the plaster ring perimeter, seal any gaps or voids with a liberal bead of acoustical sealant to create an airtight seal.

3.07 PUTTY

- A. Brush or wipe construction dust and dirt from cables and conduit.
 - 1. If surfaces are contaminated with oil, wipe with xylene or toloulene to remove oily residue.
- B. Properly space cables away from each other inside the conduit.
- C. Tightly pack mineral fiber between all cables.
 - 1. Pack mineral fiber tight around cables the full depth of the sleeve, holding back the mineral fiber 1/4" from both ends of the conduit sleeve.
- D. Fill all spaces between the cables and conduit with putty to a 1/4" depth to create an airtight seal. The putty shall be flush with both ends of the conduit sleeve or conduit stub.

3.08 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

- 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.09 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.10 PROTECTION

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

3.11 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - 2. Urethane Joint Sealant: Multi component, pourable, traffic grade, Class 25.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints in exterior insulation and finish systems.
 - c. Joints between metal panels.
 - d. Joints between different materials listed above.
 - e. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - f. Control and expansion joints in ceilings and other overhead surfaces.
 - g. Other joints as indicated.
 - 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 50.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces, except control joints scheduled to receive floor coverings, resinous flooring or polished concrete finish.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - 2. Urethane Joint Sealant: Multi component, pourable, traffic grade, class 25.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces at tile flooring.
 - 1. Joint Locations:
 - a. Expansion joints in tile flooring.
 - 2. Urethane Joint Sealant: Multi component, pourable, traffic grade, class 25.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior control/contraction joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Control/contraction joints in dyed and polished concrete slabs.
 - 2. Polyurea Joint Sealant: Multicomponent, self-leveling, traffic grade.

- 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical joints on exposed surfaces of interior unit masonry and concrete.
 - 2. Urethane Joint Sealant: Multi component, nonsag, Class 50.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Interior non-moving joints in vertical surfaces.
 - 1. Joint Locations:
 - a. Vertical joints in exposed surfaces of gypsum drywall partitions.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - c. Other joints as indicated.
 - 2. Acrylic Latex Joint Sealant: Paintable
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- H. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, counters.
 - b. Joints between backsplashes and adjacent wall surfaces at wet locations.
 - c. Tile control and expansion joints where indicated.
 - d. Other joints at wet locations where or not specifically detailed or called out to seal joints from leakage of water.
 - 2. Silicone Joint Sealant: Single component, nonsag, mildew resistant, acid curing, Class 25.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- I. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Location:
 - a. Provide acoustical joint sealant at all wall locations where sound attenuation batts are shown in the wall types.
 - b. Apply putty pads to all recessed boxes sharing a stud space where separate recessed boxes are open to both sides of wall.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Acoustical.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- J. Security Joint-Sealant Application: Interior non-moving joints in horizontal and vertical surfaces.
 - 1. Joint Locations:
 - a. Change in plane expansion and contraction joints: Floor-to-wall, head of wall, and inside corners;
 - b. Fixture Perimeters: Lights, mirrors, sinks, etc.
 - c. Door and Window Perimeters: Frame to wall, gypsum, concrete block.
 - d. Interior Seams: Steel, stainless steel, masonry, window frames, and fixtures
 - e. Protrusions and Penetrations;
 - f. Resilient Base: Perimeter joints to the wall and floor, and vertical joints between base pieces.
 - g. Other joints as indicated.
 - 2. Polyurethane Joint Sealant:
 - a. Single-component, tamper-resistant, non-sag, STPU;

END OF SECTION

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Interior expansion control systems.
- B. Exterior expansion control systems.
- C. Expansion Joint accessories including provisions for fire rated assemblies, moisture barriers, waterproofing, acoustic measures, or thermal measures.

1.03 RELATED SECTIONS

- A. Section 07 52 01 APP Modified Bituminous Membrane Roofing
- B. Section 07 62 00 Sheet Metal Flashing and Trim: Roof expansion and control joint covers.

1.04 REFERENCE STANDARDS

- A. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- B. ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- C. ASTM B308/B308M Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2010.

1.05 SUBMITTALS

- A. See Section 01 33 00 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. Samples: Submit two samples 6 inch (152 mm) long, illustrating profile, dimension, color, and finish selected.
- E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

1.06 SYSTEM DESCRIPTION

- A. Joint coverplate systems shall permit daily thermal expansion and contraction of building elements, minor foundation settlement, and common windsway movements of the structure without disengagement.
 - 1. Joint system details shall clearly indicate X-axis joint movement capabilities (horizontal contraction/ expansion). Y-axis joint movement (in-plane shear), and Z-axis movement (vertical shear) may be requested of the Manufacturer if applicable.
 - 2. Movement capabilities shall be clearly defined as a percentage of the nominal joint width or with distinct dimensions defined on product details.
- B. Joint Systems shall allow for seismic movement (if applicable), matching requirements as defined within the Project Specific Structural Specifications.
- C. Fire Rated Assemblies shall be tested by registered Third Party Testing Agencies in accordance with UL2079, ULC S115, or BS 476 classified systems. Expansion joint assembly fire rating shall match or exceed the fire rating of adjacent construction.

1.07 QUALITY ASSURANCE

- A. Manufacturer: Furnish assemblies from one (1) manufacturer with a minimum of five (5) years of experience in the design, engineering and fabrication of expansion joint systems.
- B. Installer: Firm with not less than three (3) years of successful experience in the installation of systems similar to those required by this project and acceptable to the manufacturer of the system.

1.08 DELIVERY AND STORAGE

- A. Manufacturer to provide protective film on all exposed cover plate components.
- B. Deliver joint systems to jobsite in new, clean, unopened cartons or crates of sufficient size and strength to protect materials during transit.
- C. Inspect materials upon arrival. Store components in original containers in a clean, dry location. Ensure temperature or moisture sensitive components are stored in a tempered location.
- D. Contractor to provide temporary protective covers on all installed finished surfaces. Protection is required to guard against both surface abrasions as well as overloading of horizontal deck components by construction traffic.

1.09 SEQUENCING

- A. Submittals shall be completed and remitted to the Project Architect within 4 weeks after award of subcontract.
- B. Subcontract for the work of this section shall be planned to allow sufficient time for Manufacturer's production and delivery scheduling.

1.10 WARRANTY

A. Manufacturers limited warranty against material and manufacturing defects for a period of not less than five (5) years from Date of Substantial Completion, when installed in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Joint Master, a Division of InPro Corporation (P: (800) 222-5556 / Web: www.inprocorp.com)
- B. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be accepted. Additional manufacturers will be considered in accordance with the "or equal" provision specified in Section 01 60 00 Product Requirements.
 - 1. Architectural Art Mfg, Inc .
 - 2. Construction Specialties, Inc .
 - 3. MM Systems Corp .
 - 4. Nystrom, Inc.
- C. Substitutions: Submit a request for substitution for any manufacturer not named, as specified in Section 01 25 00 Substitution Procedures.

2.02 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. Stainless Steel: Alloy Type 304 for plates and strips.
 - 1. Brushed #4 surface finish standard
- C. Elastomeric Seals: Synthetic rubber seals comprised of a dual extrusion Santoprene rubber for heat welding of all transitions and seams for a monolithic, weathertight installation. EPDM and

Neoprene substitutions are not allowed due to their lack of ability to meet this specific requirement.

- 1. All Santoprene seals must be certified as low VOC as certified by UL Environmental GreenGuard Gold Certification
- D. Horizontal and Vertical Moisture Barrier (optional accessory): Min. 45 mil thick fabric reinforced EPDM with optional watertight drain assemblies.
- E. Horizontal and Vertical Insulated Vapor Barrier (optional accessory):
 - 1. Min. R Value of 15
 - 2. Must meet ASTM E1399 Cyclic movement requirements matching movement requirements specific to project.

2.03 INTERIOR WALL AND CEILING JOINT SYSTEMS

- A. Glide Plate Expansion Joint Systems
- B. Expansion Joint System, Type EJ-1:
 - 1. Product: JointMaster, Model No. 300-A07-100.
 - 2. Type: Glide Plate Expansion Joint System.
 - 3. Application: Wall-to-Wall and Ceiling-to-Ceiling Conditions.
 - 4. Joint Size: 4-inches.
 - 5. Movement:
 - a. Horizontal: 2-inches.
 - b. Vertical: 1-inch.
 - 6. Finish: Clear anodized.
- C. Expansion Joint System, Type EJ-2:
 - 1. Product: JointMaster, Model No. 300-A09-100.
 - 2. Type: Glide Plate Expansion Joint System.
 - 3. Application: Wall-to-Corner and Wall-to-Ceiling Conditions.
 - 4. Joint Size: 4-inches.
 - 5. Movement:
 - a. Horizontal: 2-inches.
 - b. Vertical: 1-inch.
 - 6. Finish: Clear anodized.

2.04 EXTERIOR VERTICAL WALL JOINT SYSTEMS

- A. Vertical Open Cell Silicone Faced Water-resistant Foam:
- B. Expansion Joint System, Type EJ-3:
 - 1. Product: JointMasters, Model No. 1200-200.
 - 2. Type: Pre-compressed open micro-cell polyurethane foam impregnated with a polymer sealing compound.
 - 3. Application: Wall-to-Wall and Wall-to-Corner conditions.
 - 4. Foam joint sealant is field compressed and is non-drying, non-shrinking, self-healing, and self-expanding.
 - 5. Exposed surface(s) is silicone coated with single, double, or triple faced configurations available.
 - 6. Color/s: To be selected from manufacturers standard colors.
 - 7. Joint Width: 2-inches.
 - 8. Joint Operating Range: 50%+- of total nominal joint width.
 - 9. Orientation: Vertical.

2.05 EXTERIOR ROOF JOINT SYSTEMS

- A. Expansion Joint System, Type EJ-4:
 - 1. Type: Metal Coverplate Roof Expansion Joint System.
 - 2. Product: JointMasters, Model No. 661-A02-050.
 - 3. Application: Roof-to-Wall condition.
 - 4. Joint Width: 2-inches (51 mm).

- 5. Frame Height: 1-1/4 inches (32 mm)
- 6. Sightline: 3-5/8 inch (92 mm)
- 7. Movement:
 - a. Horizontal: 1-inch
 - b. Vertical: 1-inch
- 8. Finish: Clear anodized aluminum.
- 9. Installation: Curb-Mounted.
- B. Expansion Joint System, Type EJ-5:
 - 1. Type: Metal Coverplate Roof Expansion Joint System.
 - 2. Product: JointMasters, Model No. 661-A02-100.
 - 3. Application: Roof-to-Wall condition.
 - 4. Joint Width: 4-inches (102 mm).
 - 5. Frame Height: 1-1/4 inches (32 mm)
 - 6. Sightline: 6-1/2 inch (165 mm)
 - 7. Movement:
 - a. Horizontal: 2-inches
 - b. Vertical: 2-inches
 - 8. Finish: Clear anodized aluminum.
 - 9. Installation: Curb-Mounted.

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.
- B. Provide strippable coating to protect finish surface.

END OF SECTION

SECTION 08 12 13

HOLLOW METAL FRAMES FOR WOOD DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Non-rated and fire-rated hollow metal frames for wood doors.
- B. Non-rated and fire-rated hollow metal borrowed lite glazing frames.

1.03 RELATED SECTIONS

- A. Section 08 71 00 Door Hardware.
- B. Section 08 80 00 Glazing.
- C. Section 09 91 23 Interior Painting.
- D. Section 13 49 13 Integrated X-Ray Shielding Assemblies

1.04 REFERENCE STANDARDS

- A. ADA Standards Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2011).
- C. ANSI/SDI A250.6 Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).
- D. ANSI/SDI A250.6 Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2003 (R2009).
- E. ANSI/SDI A250.8 Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- 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 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; 2016.
- H. ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.
- I. BHMA A156.115 American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- J. ICC A117.1 Accessible and Usable Buildings and Facilities; 2009.
- K. NAAMM HMMA 830 Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- N. NAAMM HMMA 861 Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.
- O. NFPA 257 Standard on Fire Test for Window and Glass Block Assemblies; 2012.
- P. UL 9 Standard for Fire Tests of Window Assemblies; Current Edition, Including All Revisions.
- Q. NFPA 80 Standard for Fire Doors and Other Opening Protectives; 2016.
- R. NFPA 105 Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.

S. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 01 33 00 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. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- Fire-Rated Borrowed Lite Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
- D. Smoke-Control Door and Frame Assemblies: Comply with NFPA 105 or UL 1784.
- E. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- F. 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. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Products from <u>Steelcraft</u> are specified to establish a standard of quality for design, function, materials, and appearance.
- B. Other Manufacturers: The following manufacturers are approved to provide materials or products that are equivalent to the "Basis of Design":
 - 1. Ceco Door.
 - 2. Fleming Door Products.
 - 3. Mesker.
 - 4. Republic Doors.
 - 5. Amweld Building Products, LLC.
 - 6. Curries Company.
- C. Substitutions: Refer to Section 01 25 00 Substitution Procedures.

2.02 DESIGN CRITERIA

A. Requirements for Hollow Metal Frames:

- 1. Steel used for fabrication of frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
- 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
- 3. Door Edge Profile: Manufacturers standard for application indicated.
- 4. Typical Door Face Sheets: Flush.
- 5. Glazed Lites: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
- 6. 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.
- Zinc Coating: Metal components shall be zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise.
 - a. Interior Doors:
 - 1) Typical Locations: Provide at least A25/ZF75 (galvannealed) for interior applications
 - 2) Corrosive Locations: G60/Z180 (galvanized)
- B. Hollow Metal Panels: Same construction, performance, and finish as doors.
- 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 FRAMES

- A. Basis of Design Product/s: Steelcraft; as follows:
 - 1. F Series: Double rabbet, Single rabbet, and Cased opening set-up and welded frame.
 - 2. FE Series: Double egress, set-up and welded frame.
- B. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
 - 2. Frame Finish: Factory primed and field finished.
 - 3. Reinforcement: Provide high frequency hinge reinforcement at top hinge location.
- D. Interior Door Frames, Fire-Rated: Full profile/continuously welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
 - 3. Frame Finish: Factory primed and field finished.
- E. Frame Hardware Reinforcement:
 - 1. Mortise Hinge Reinforcements: 7 gauge, 0.180 inch, minimum.
 - 2. Strike Reinforcements: 16 gauge, 0.067 inch, minimum. Prep for an ANSI-A115.1-2 strike.
 - 3. Closer Reinforcements: 14 gauge, 0.067 inch, minimum.
 - 4. Projection weld hinge and strike reinforcements to the door frame.
 - 5. Minimum hardware reinforcing gages shall comply with Table 4 of ANSI/SDI A250.8.
- F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- G. Mullions for Pairs of Doors: Removable type, with profile similar to jambs.
- H. Borrowed Lites / Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- I. Transom Bars: Fixed, of profile same as jamb and head.

- J. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- K. Frames Wider than 48 inches (1219 mm): Reinforce with steel channel fitted tightly into frame head, flush with top.
- L. Frames Installed Back-to-Back: Reinforce with steel channels anchored to floor and overhead structure.

2.04 FINISHES

A. Shop Prime Finish: Apply manufacturer's standard fast-curing, lead- and chromate-free primer, complying with ANSI A250.10 acceptance criteria; immediately after cleaning and pretreating. Primer shall be recommended by primer manufacturer for substrate and compatible with substrate and field-applied coatings.

2.05 FRAME ANCHORS

- A. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick. Install quantities per a Paladin storm door requirement.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.06 STOPS AND MOLDINGS

- A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.
- B. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

2.07 ACCESSORIES

- A. Glazing: As specified in Section 08 80 00.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Astragals for Double Doors:
 - 1. Fire-Rated Doors: Steel, shape as required for fire rating.
- D. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- E. Grout for Frames: Portland cement grout with maximum 4 inch (102 mm) slump for hand troweling; thinner pumpable grout is prohibited.
- F. 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.
- G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.08 FABRICATION

- A. Fabricate hollow metal frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

- 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
- 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
- 5. All frames shall be delivered with factory installed spreaders.
- 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Fire ratings may require additional anchors.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
 - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
 - 3) Two anchors per head for frames above 42 inches (1066 mm) wide and mounted in metal-stud partitions.
- 7. Door Silencers: Drill stops to receive door silencers as follows.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
 - c. Keep holes clear during construction.
- D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 - 1. Locate hardware as indicated according to ANSI/SDI A250.6.
 - 2. Reinforce frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 and 28 Sections.
- F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on secure side of interior door frames.
 - 4. Provide loose stops and moldings on inside of hollow metal work.
 - 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. 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. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness.
 - 1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

- 2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
- 3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
- 4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap frames to receive non-templated, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

- A. Install door frames in accordance with manufacturer's instructions and RELATED SECTIONS of specified door and frame standards or custom guidelines indicated.
- B. Install fire-rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 71 00.
 - 1. Comply with recommended practice for hardware placement in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- E. Comply with glazing installation requirements of Section 08 80 00.
- F. Coordinate installation of electrical connections to electrical hardware items.
- G. Prime Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.05 FRAME SCHEDULE

A. Refer to Door and Frame Schedule on Sheet A4.1.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD VENEER DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Solid core doors with wood veneer faces, non-rated and fire-rated.

1.03 RELATED SECTIONS

- A. Section 08 11 13 Hollow Metal Doors and Frames
- B. Section 08 71 00 Door Hardware
- C. Section 08 80 00 Glazing.

1.04 REFERENCE STANDARDS

- A. 16 CFR 1201 Safety Standard for Architectural Glazing Materials; current edition.
- B. ANSI A208.1 American National Standard for Particleboard; 2009.
- C. NFPA 80 Standard for Fire Doors and Other Opening Protectives; 2016.
- D. NFPA 105 Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- E. NFPA 252 Standard Methods of Fire Tests of Door Assemblies; 2012.
- F. UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- G. WDMA I.S. 1A Interior Architectural Wood Flush Doors; 2013.

1.05 SUBMITTALS

- A. Submit under the provisions of Section 01 33 00 Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including door construction description and WDMA I.S.1-A and AWS classifications.
- C. Schedules: Submit manufacturer's schedules, including door dimensions, cutouts, species, finish, and hardware. Reference individual door numbers as indicated on the Drawings.
- D. 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.
- E. Samples for Initial Selection: Submit two samples of door veneer, 6 by 6 inch (____ by ____ mm) in size illustrating wood grain, stain color, and sheen.
- F. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.
 - 2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide samples for each species of veneer and solid lumber required, with factory stain finish range as selected by Architect.
 - b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.
 - 3. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.06 QUALITY ASSURANCE

- A. Tolerances for Warp, Telegraphing, Squareness, and Prefitting Dimensions: WDMA I.S.1-A.
- B. Identifying Label: Each door shall bear identifying label indicating:
 - 1. Door manufacturer.

- 2. Order number.
- 3. Door number.
- 4. Fire rating, if applicable.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.
 - 1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - 2. Labeled by Intertek/Warnock Hersey.
 - a. Construction Details and Hardware Application: Approved by labeling agency.
 - 3. Positive Pressure Opening Assemblies: UL 10C.
- D. Environmental Responsibility: Provide doors manufactured with the following environmentally responsible components:
 - 1. Core:

d.

- a. Agrifiber Core:
 - 1) Rapidly renewable materials.
 - 2) Pre-consumer recycled content.
 - 3) No added urea formaldehyde.
- b. Particleboard Core:
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) Pre-consumer recycled material.
 - 3) No added urea formaldehyde.
- c. Stave Lumber Core:
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) No added urea formaldehyde.
 - Structural Composite Lumber (SCL) Core:
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) No added urea formaldehyde.
- 2. Composite Crossband:
 - a. High-Density Fiberboard (HDF):
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) Pre-consumer recycled material.
 - 3) No added urea formaldehyde.
- 3. Stiles and Rails:
 - a. Structural Composite Lumber (SCL):
 - 1) Forest Stewardship Council (FSC) certified.
 - 2) No added urea formaldehyde.
- 4. GREENGUARD Certification Program.
 - a. GREENGUARD Indoor Air Quality Certified.
 - b. GREENGUARD Children and Schools Certified.

1.07 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.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.

1.09 WARRANTY

- A. Manufacturers' Warranty: Warrant flush wood veneer doors for life of installation against warpage, delamination, and defects in materials and workmanship.
 - 1. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: V.T. Industries
 - 1. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.
- B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.02 SOLID CORE WOOD DOORS, NON-RATED & 20-MINUTE

- A. Basis of Design Product: V.T. Industries; "Heritage" Collection, 5-Ply Bonded Doors.
 - 1. Door Type, Manufacturer, Model Number, and Core Type:
 - a. Non-Rated Doors: VTI; Model No. 5502H, with PC-5 particleboard core.
 - b. 20-Minute Rated Doors: VTI; Model No. 5502H, with PC-20-5 particleboard core.
 - c. 20-Minute Rated, Positive Pressure Doors: VTI; Model No. 5P02H, with PC-20PP-5 particleboard core.
- B. Seven-ply and non-bonded core construction is not acceptable.
- C. Compliance: WDMA I.S. 1A.
 - 1. Aesthetic Grade: Custom Grade.
 - 2. Duty Level: Extra Heavy Duty.
 - 3. Core Type: PC-5.
- D. Door Thickness: 1-3/4 inches (44 mm).
- E. Stiles:
 - 1. Inner Stiles: 1-3/8 inches wide, before pre-fitting.
 - 2. Structural Composite Lumber (SCL) With Outer Stile: Same species as face veneer.
 - 3. Outer Stile: Apply after beveling and before face application.
- F. Rails:
 - 1. Structural composite lumber (SCL).
 - 2. Width before pre-fitting: 1-3/8 inches, minimum.
- G. Cores:
 - 1. Material: Particleboard.
 - 2. Particleboard and Agrifiber Compliance: ANSI A208.1, Grade 1-LD-2.
 - 3. Stave Lumber Core Compliance: Blocks and strips not more than 2-1/2 inches wide, one species of wood.
- H. Door Assembly:
 - 1. Stiles and Rails: Bonded to core.
 - 2. Sand entire assembly flat as a unit to ensure minimal telegraphing of core components through face veneers.
- I. Composite Crossbands:
 - 1. Apply to core in hot press using Type I, exterior, water-resistant adhesive, before application of hardwood edges.
 - 2. Exposed Crossbanding: Not allowed along stile edges.
- J. Veneers:
 - 1. Apply to crossbanded core in hot press using Type I, exterior, water-resistant adhesive.
 - 2. Refer to "Door Facings" Article this Section for veneer species, cut, match and assembly.
- K. Positive Pressure Doors:

- 1. Where UL 10C standards for positive pressure apply, doors shall be constructed in accordance with Category A guidelines as published by Intertek/Warnock Hersey.
- 2. Smoke Gasketing: Apply smoke gasketing around frame perimeter and between door and pairs to meet Smoke (S) rating.
- 3. Intertek/Warnock Hersey Category A Guidelines: Edge sealing systems not allowed on frames.
- L. Provide "VTSmartdoor" electronic barcode on all 20-minute rated doors:
 - 1. Location: Fire label, hinge stile of doors.
 - 2. Provide fire-rated door assembly information required for Owner's annual fire-door inspection in accordance with NFPA 80, Paragraph 5.2.1.
- M. Transom Panels: Same construction and finish as door; same performance rating as door.

2.03 SOLID CORE WOOD DOORS, FIRE RATED

- A. Basis of Design Product: VTI; "Heritage Collection", 5-Ply Flush Fire-Rated Wood Doors.
- B. Door Type, Model Number, and Core Type:
 - 1. 45-Minute Rated Doors:
 - a. Model No. 5545H; FD-45-5 mineral core.
 - b. Model No. 5P45H; FD-45PP-5 mineral core, positive pressure.
 - 2. 60-Minute Rated Doors:
 - a. Model No. 5511H; FD-60-5 mineral core.
 - b. Model No. 5P11H; FD-60PP-5 mineral core, positive pressure.
 - 3. 90-Minute Rated Doors:
 - a. Model No. 5511H; FD-90-5 mineral core.
 - b. Model No. 5P11H; FD-90PP-5 mineral core, positive pressure.
 - 4. Compliance: WDMA I.S. 1A.
 - a. Aesthetic Grade: Custom Grade.
 - b. Duty Level: Extra Heavy Duty.
 - c. Type: FD-XX-5 or FD-XXPP-5 (XX = 45-, 60-, or 90-minute fire rating).
- C. Door Thickness: 1-3/4 inches (44 mm).
- D. Outer Edges: Same species as face veneer.
- E. Inner Stiles: Structural composite lumber (SCL).
- F. Rails:
 - 1. Structural composite lumber (SCL).
 - 2. Width: Manufacturer's standard width.
- G. Core:
 - 1. 5-ply fire-retardent mineral core (FD) that does not contain asbestos or added urea formaldehyde.
 - 2. Povide core blocking as required to provide adequate anchorage of hardware without through-bolting.
- H. Composite Crossbands:
 - 1. Apply to core in hot press using Type I, exterior, water-resistant adhesive before application of hardwood edges.
 - 2. Exposed Crossbanding: Not allowed along stile edges.
- I. Veneers:
 - 1. Apply to crossbanded core in hot press using Type I, exterior, water-resistant adhesive.
 - 2. Refer to "Door Facings" Article this Section for veneer species, cut, match and assembly.
- J. Positive Pressure: 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.

- K. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide flush wood door assemblies in compliance with WDMA I.S. 1A requirements for "S" label; no additional gasketing or edge sealing allowed.
- L. Provide "VTSmartdoor" electronic barcode on all fire-rated doors:
 - 1. Location: Fire label, hinge stile of doors.
 - 2. Provide fire-rated door assembly information required for Owner's annual fire-door inspection in accordance with NFPA 80, Paragraph 5.2.1.

2.04 DOOR FACINGS

- A. Apply veneers to crossbanded core in hot press using Type I, exterior, water-resistant adhesive.
- B. Veneer Facing for Transparent Finish:
 - 1. Species: Selected by Architect from manufacturer's standard finishes.
 - 2. Grade: HPVA Grade A.
 - 3. Cut: plain sliced (flat cut).
 - 4. Veneer Leaf Matching: book match.
 - 5. Matching Within a Veneer Face: running match.
 - 6. Vertical Edges: Same species as face veneer.
 - a. Bevel: 3-degrees each stile.
 - 7. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet (3 m) of each other when doors are closed.
 - 8. Transoms: Continuous match to doors.

2.05 FINISHES

- A. Doors shall receive factory finishing.
- B. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
 - 1. Transparent:
 - a. System TR-8, UV Cured Acrylated Polyester/Urethane, premium grade.
 - 1) Stain coat.
 - 2) Sealer: 3 coats.
 - 3) Sanding: Sand.
 - 4) Topcoat: 2 coats.
 - b. Finish Name: TBD.
 - c. Finish #: TBD
 - d. Sheen: Satin.
- C. Top and Bottom Rails: Factory sealed.
- D. Seal door top edge with color sealer to match door facing.

2.06 ACCESSORIES

- A. Hollow Metal Door Frames: Refer to Section 08 11 13.
- B. Glazed Openings: Refer to Section 08 80 00.
 - 1. Provide heat-strengthened, fully-tempered, laminated, insulating, or fire-rated glass as needed.
- C. Glass Lite Mouldings:
 - 1. Non-rated Flush Doors: VT Industries; Style VT1 (1/4" Glass); Flush wood lite mouldings:
 - a. Flush wood lite mouldings have one side fixed into place with brads at the factory. The other side is temporarily tacked into place so glass and glazing can be installed at the jobsite. Field fitting of glass and glazing is the responsibility of the installer. Use of a glazing compound or caulking is recommended to reduce glass rattle. All profiles have a tolerance of ±0.005 inches.
 - b. Wood Moulding Material: Match the face veneer on the door.
 - 2. 20-Minute Rated Flush Doors:
 - a. Flush Wood Lite Mouldings: VT Industries; Style VT1 (1/4" Glass) with metal glazing clips:

- 1) Wood lite mouldings have one side fixed into place with brads at the factory, along with one-half of Fire Clip[™]. The other side is temporarily tacked into place so glass and glazing can be installed at the jobsite. Remaining halves of Fire Clips[™] are shipped loose, to be installed with glass. Field fitting of glass and glazing is the responsibility of the installer. Use of a glazing compound or caulking is required. All profiles have a tolerance of ±0.005 inches.
- 2) Wood Moulding Material: Match the face veneer on the door.
- b. Metal Vision Frame:
 - 1) Basis of Design Product: VT Industries; Style #110 Metal Vision Frame.
 - (a) Material: Frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet.
 - (b) Finish: Factory primed for field-applied paint finish.
 - (c) Glass Thickness: As scheduled.
- 45-, 60- and 90-Minute Fire-Rated Doors:
- a. Metal Vision Frame:
 - 1) Basis of Design Product: VT Industries; Style #110 Metal Vision Frame.
 - (a) Material: Frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet.
 - (b) Finish: Factory primed for field-applied paint finish.
 - (c) Glass Thickness: As scheduled.
- D. Astragals:

3.

- 1. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.
- 2. Astragals for Fire-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.
- E. Door Hardware: As specified in Section 08 71 00.

2.07 FABRICATION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 - 1. Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
 - 2. Provide solid blocks at lock edge for hardware reinforcement.
 - 3. 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. Prefit Doors:
 - 1. Prefit and bevel doors at factory to fit openings.
 - 2. Prefit Tolerances: WDMA I.S. 1A and AWS Section 9.
- E. Hardware:
 - 1. Factory-machine doors for mortised hardware, including pilot holes for hinge screws and lock fronts required.
 - 2. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- F. Glazed Openings in Doors:
 - 1. Refer to "Accessories" Article this Section for light frame types.
 - 2. Provide non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- G. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
 - 1. Exception: Doors to be field finished.
- H. Provide edge clearances in accordance with the quality standard specified.

- I. Undercut:
 - 1. Bottom of Door: 5/8 inch.
 - 2. Top and Sides: 1/8 inch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine locations to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.
- B. Ensure frames are solidly anchored, allowing no deflection when doors are installed.
- C. Ensure frames are plumb, level, square, and within tolerance.

3.02 PREPARATION

A. Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.

3.03 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.
 - 2. Install smoke and draft control doors in accordance with NFPA 105 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, hardware, and glazing.
- E. Doors, operators, and frame mounted equipment interlocks shall be installed by the manufacturer and as indicated on the approved shop drawings. Touch up shop applied prime coat as required and ready for finish paint.
 - 1. Door speeds: Set by the manufacturer to comply with ANSI 156.10-2005
 - 2. Electrical connections: Frame mounted equipment interlocks shall be connected to the electrical distribution system under Division 26 Electrical.

3.04 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.
- C. Maximum variation from plumb or level: 1/8 inch.
- D. Maximum offset from true dimensional alignment: 1/8 inch.

3.05 ADJUSTING

- A. Adjust doors to swing freely, without binding in frame.
- B. Adjust hardware to operate properly.
- C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- D. Remove and replace damaged doors that cannot be successfully repaired, as determined by Architect.

3.06 CLEANING

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that could damage finish.

3.07 PROTECTION

A. Protect installed doors from damage during construction.

END OF SECTION

SECTION 08 14 23

PLASTIC LAMINATE CLAD WOOD DOORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Interior High-Pressure Decorative Laminate Faced Wood Doors
- B. Lite frames and glazing in clad wood doors
- C. Lead-lined doors.

1.03 RELATED REQUIREMENTS

- A. Section 08 11 13 Hollow Metal Doors and Frames
- B. Section 08 71 00 Door Hardware
- C. Section 08 80 Glazing

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including door construction description and WDMA I.S.1-A and AWS classifications.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the clad door supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Schedules: Submit manufacturer's schedules, including door dimensions, cutouts, species, finish, and hardware. Reference individual door numbers as indicated on the Drawings.
- D. 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.
- E. Samples for Initial Selection: Submit two samples of door veneer, 6 by 6 inch (____ by ____ mm) in size illustrating wood grain, stain color, and sheen.
- F. Samples for Verification:
 - 1. Samples: Submit two samples of plastic laminate for each pattern as selected.
 - 2. Decorative laminate, 8 by 10 inches, for each color and pattern selected.
 - 3. Corner Sections of Door: Approximately 5-inches by 10-inches (127-mm by 250-mm), with door faces and edges representing actual materials to be used.
 - 4. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.
- G. Warranty: Sample of special warranties.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain clad wood doors through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, latest edition, "Industry Standard for Architectural Wood Flush Doors." and the following minimum values (for particle core doors):
 - 1. NWWDA TM-7 Cycle Slam Test: 1,000,000 cycles.
 - 2. NWWDA TM-8 Hinge Loading Test 1,000 lbs.
 - 3. NWWDA TM-10 Edge Screw Holding Test 850 lbs.
 - 4. NWWDA TM-10 Face Screw Holding Test 650 lbs.
- C. Fire Rated Wood Doors: Doors 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 at positive pressure according to NFPA 252 (neutral pressure at 40" above sill)

or UL 10C. Doors shall be constructed in accordance with Category A guidelines as published by Intertek/Warnock Hersey.

- 1. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies provide manufacturer's construction label, indicating compliance to independent 3rd party certification agency's procedure, except for size.
- Temperature Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire test exposure.
- 3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- 4. Blocking: When through-bolts are not to be used, indicate size and location of blocking in 45, 60 and 90 minute mineral core doors
- D. Identifying Label: Each door shall bear an identifying label indicating:
 - 1. Door Manufacturer, Order Number, Door Number, Fire rating (if applicable).
- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for receiving, handling, and installing clad wood doors.

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 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Do not subject doors to extreme conditions or changes in temperature or relative humidity in accordance with WDMA I.S.1-A.

1.08 WARRANTY

- A. Manufacturers' Warranty: Warrant clad wood doors for life of installation against warpage, delamination, and defects in materials and workmanship.
 - 1. Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing, and rehanging as required.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Specified Manufacturer: Oskosh Door Company.
 - 1. Other Acceptable Manufacturer's: Equivalent products of the manufacturer's listed below will be acceptable.
 - a. Eggers Industries.
 - b. Graham and Maiman Wood Doors.
 - c. Haley Brothers .
 - d. V.T. Industries.
 - e. Oregon Door.
 - f. Poncraft Door Company.
 - g. Ampco Products, Inc.

- h. Marshfield DoorSystems, Inc.
- 2. Substitutions: See Section Not permitted.

2.02 CLAD WOOD DOORS AND PANELS

- A. Product: Oskosh Door; GP and GLL, Flush Solid-Core High-Pressure Decorative Laminate Doors.
 - 1. Type: High Pressure Decorative Laminate (HDPL):
 - a. Non-Rated, 20-Minute Fire-Rated, and Fire-Rated:
 - 1) Fire-Rating: As indicated in drawings
- B. Compliance: WDMA I.S. 1A.
 - 1. Aesthetic Grade: Premium Grade.
 - 2. Duty Level: Extra Heavy Duty.
 - 3. Type: 5-Ply, bonded core.
 - a. Seven-Ply and Non-Bonded Core Construction: Not acceptable.
- C. Cores: See below.
- D. Environmentally Responsible Doors: Provide where specified doors manufactured with the following environmentally responsible components:
 - 1. Particleboard Core:
 - a. Low Emitting Materials: Interior flush clad wood doors must contain no added urea-formaldehyde resins.
- E. High-Pressure Decorative Laminates: NEMA LD3.
 - 1. Face laminate doors with high-pressure decorative laminates.
 - 2. Face Laminate doors (two faces and two horizontal edges) with High Pressure Decorative Laminates.
 - a. Face laminate the two vertical edges of fire rated pairs of doors only.
 - 3. Nominal Minimum Thickness for Faces and Vertical Edges: 0.048-inch.
 - 4. Laminate Selection: As indicated on the Interior Finish Legend in the drawings.
 - 5. Finish: Manufacturer's standard.
 - 6. Grade: General purpose, horizontal grade.
- F. Door Edge Banding: See below.

2.03 HPDL CLAD DOORS; NON-RATED AND 20-MINUTE FIRE-RATED

A. Door Types (VTI; Heritage Collection): 5-Ply Flush Non-Rated and 20-Minute Fire-Rated HPDL Clad Doors.

1. Model Nos.: PC-HPDL-5, PC-20-HPDL-5, and PC-20PP-HPDL-5.

- B. Door Thickness: 1-3/4 inches (44 mm).
- C. Door Facings:
 - 1. High Pressure Decorative Laminate Facing for Non-Fire-Rated Doors: NEMA LD 3, HGS.
 - 2. Color or Wood Grain Pattern: As indicated on the Interior Finish Legend in the drawings.
- D. Door Edge Banding:
 - 1. PVC Edge Banding: 0.12-inch (3-mm) thick for vertical door edges, all doors.
 - a. Exception: Provide HDPL on the vertical edges of doors of fire-rated door pairs.
 - 2. Color: Manufacturer's standard for matching face laminate.
- E. Door Construction:
 - 1. Core: Particleboard core (PC), 5-ply.
 - a. Compliance: ANSI A208.1, Grade 1-LD-2.
 - Wood Stiles and Rails: As required to meet Extra Heavy Duty Performance level.
 a. Structural Composite Lumber at non-rated doors and manufacturer's standard
 - non-combustible material at fire rated doors.
 - 3. Blocking: As required to meet Extra Heavy Duty Performance level and fire rating requirements.
- F. Positive Pressure Doors:

- 1. Where UL 10C standards for positive pressure apply, doors shall be constructed in accordance with Category A guidelines as published by Intertek/Warnock Hersey.
- 2. Smoke Gasketing: Apply smoke gasketing around frame perimeter and between door and pairs to meet Smoke (S) rating.
- 3. Intertek/Warnock Hersey Category A Guidelines: Edge sealing systems not allowed on frames.
- G. Transom Panels: Same construction and finish as door; same performance rating as door.

2.04 HPDL CLAD DOORS; 45-, 60-, AND 90-MINUTE FIRE-RATED

- A. Door Types (VTI; Heritage Collection): 5-Ply Flush Fire-Rated HPDL Doors; for ratings in excess of 20-minutes.
- B. Model Nos.: FD-45-HPDL-5, FD-45PP-HPDL-5, FD-60-HPDL-5, FD60PP-HPDL-5, FD-90-HPDL-5 and FD-90PP-HPDL-5.
- C. Door Thickness: 1-3/4 inches (44 mm).
- D. Door Facings:
 - 1. High Pressure Decorative Laminate Facing for Fire-Rated Doors: NEMA LD 3, HGF.
 - 2. Color or Wood Grain Pattern: As indicated on the Interior Finish Legend in the drawings.
- E. Door Edge Banding:
 - 1. PVC Edge Banding: 0.12-inch (3-mm) thick for vertical door edges, all doors.
 - a. Exception: Provide HDPL on the vertical edges of doors of fire-rated door pairs.
 - 2. Color: Manufacturer's standard for matching face laminate.
- F. Door Construction:
 - 1. Core:
 - a. Material: Fire Retardent Mineral Core (FD), 5-ply; core does not contain asbestos or added urea formaldehyde.
 - b. Core: Non-combustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire protection rating indicated.
- G. Stiles and Rails:
 - 1. 45-minute rated doors: Provide structural composite lumber (SCL) stiles and rails
 - 2. 60- and 90-minute rated doors: Provide manufacturer's standard non-combustible material for stiles and rails.
- H. Blocking: Provide composite blocking with improved screw holding capability approved for use in doors of fire protection ratings indicated as needed to eliminate through-bolting hardware.
- I. Positive Pressure:
 - 1. Where UL 10C standards for positive pressure apply, doors shall be constructed in accordance with Category A guidelines as published by Intertek/Warnock Hersey.
 - 2. Smoke Gasketing: Apply smoke gasketing around frame perimeter and between door and pairs to meet Smoke (S) rating.
 - 3. Intertek/Warnock Hersey Category B Guidelines: Edge sealing systems not allowed on frames.

2.05 HIGH PRESSURE DECORATIVE LAMINATE (HPDL) DOORS; LEAD-LINED

- A. Door Types (GLL): PC-HPDL-5, PC-20-HPDL-5 and PC-20PP-HPDL-5 with high pressure decorative laminate faces thermally fused to cores under heat and pressure.
 - 1. Color or Wood Grain Pattern: Refer to Interior Finish Material Schedule
 - 2. Provide doors with pilot holes factory drilled for vertical edge hinges and lock sets.
 - 3. Non-rated and 20 minute rated fire doors with lead sheet on both sides of core:
 - a. Max. combined lead thickness" 1/4 inch.
 - b. Lead lining:
 - 1) Thickness and quality: conform to shielding report
 - 2) Maintain integrity of lead lining
 - 4. Edges: PVC edge banding, 0.12 inch (3 mm) thick, for vertical door edges, manufacturer's standard for matching face laminate. PVC edge band shall not be provided on the vertical

edges of doors of fire rated door pairs; HPDL shall be provided on the vertical edges of doors of fire rated pairs.

2.06 LIGHT FRAMES AND GLAZING

- A. Product: VTI; Style #110 Metal Vision Frame.
 - 1. Material: Frame formed of 0.048-inch (1.2-mm) thick, cold-rolled steel sheet.
 - 2. Finish: Factory primed for field-applied paint finish.
 - 3. Glass Thickness: As scheduled.
- B. Glazing: Refer to Section 08 80 00.

2.07 FABRICATION

- A. Factory fit doors to suit frame opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 1. Comply with requirements in NFPA 80 for fire rated doors.
- B. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Factory machine astragals and formed steel edges for hardware for pairs of fire rated doors.
- C. Openings: Cut and trim openings through doors in factory.
 - 1. Light Openings: Trim openings with lite frame style indicated.
 - 2. Glazing: Comply with applicable requirements in Division 08 Section "Glazing."
 - 3. Louvers: Factory install louvers in prepared openings.
- D. Electrical Raceways: Provide clad wood doors receiving electrified hardware with concealed wiring harness and standardized Molex[™] plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through wire transfer hardware or wiring harness specified in Section 08 71 00. Wire nut connections are not acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine locations to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.
- B. Ensure frames are solidly anchored, allowing no deflection when doors are installed.
- C. Ensure frames are plumb, level, square, and within tolerance.

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.
 - 2. Install smoke and draft control doors in accordance with NFPA 105 requirements.
- B. Install doors at locations indicated on the Drawings.
- C. Install doors plumb, level, and square.
- D. Install door hardware as specified in Section 08 71 00.
- E. Coordinate installation of doors with installation of frames, hardware, and glazing.

3.03 ADJUSTING

- A. Operation: Re-hang or replace doors that do not swing or operate freely.
- B. Replace doors that do not comply with requirements. Doors may be repaired if work complies with requirements and shows no evidence of repair or refinishing.

3.04 CLEANING

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that could damage finish.

3.05 PROTECTION

A. Protect installed doors from damage during construction.

END OF SECTION

SECTION 08 17 43

FRP / ALUMINUM HYBRID DOORS WITH ALUMINUM FRAMES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Fiberglass reinforced polyester (FRP) flush doors with aluminum frames.

1.03 RELATED SECTIONS

Section 084313 - Aluminum-Framed Entrances and Storefronts.

Section 08 71 00 - Door Hardware.

Section 08 80 00 - Glazing.

1.04 REFERENCE STANDARDS

- A. AAMA 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- B. ANSI A250.4 American National Standard Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings; 2011.
- C. ANSI/SDI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- D. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus; 2016.
- E. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- G. ASTM D1308 Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2002 (Reapproved 2013).
- H. ASTM D1621 Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2016.
- I. ASTM D1623 Standard Test Method for Tensile And Tensile Adhesion Properties of Rigid Cellular Plastics; 2009.
- J. ASTM D2126 Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging; 2015.
- K. ASTM D256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.
- L. ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.
- M. ASTM D570 Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- N. ASTM D638 Standard Test Method for Tensile Properties of Plastics; 2014.
- O. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2016.
- P. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor; 2013a.
- Q. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- R. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

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- S. 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).
- T. ASTM E330/E330M Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- U. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- V. ASTM F476 Standard Test Methods for Security of Swinging Door Assemblies; 2014.

1.05 DESIGN / PERFORMANCE REQUIREMENTS

- A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements:
- B. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf (359 Pa).
- C. Air Leakage: Maximum of 0.58 cu ft/min/sq ft at 0.58 psf (___ L/sec/sq m at ___ Pa) differential pressure, when tested in accordance with ASTM E283.
- D. Salt Spray, Exterior Doors and Frames: ASTM B117: Minimum of 500 hours.
- E. Thermal Transmittance, Exterior Doors: AAMA 1503, U-value of 0.29, maximum, measured on exterior door in size required for this project.
 - 1. CRF Value: 55, minimum.
- F. Acoustical Performance: Sound Transmission Class (STC) of 25, minimum, when tested in accordance with ASTM E90.
- G. Swinging Door Cycle Test, Doors and Frames: ANSI A250.4: Minimum of 25,000,000 cycles.
- H. Cycle Slam Test Method: NWWDA T.M. 7-90: Minimum 5,000,000 Cycles.
- I. Swinging Security Door Assembly, Doors and Frames: ASTM F476: Grade 40.
- J. Fiberglass Reinforced Plastic (FRP) Face Sheet Properties:
 - 1. Surface Burning Characteristics, Class A per ASTM E84.
 - a. Flame Spread: Maximum of 25.
 - b. Smoke Developed: Maximum of 450.
 - 2. Impact Strength: ASTM D256, 14 ft lbf/inch of width, minimum, with notched izod.
 - 3. Tensile Strength: ASTM D638, 13,000 psi, nominal.
 - 4. Water Absorption: ASTM D570, 0.20 percent, maximum, after 24 hours at 74 degrees F (23 degrees C).
 - 5. Flexural Strength: ASTM D790, 21,000 psi, nominal.
 - 6. Indentation Hardness: ASTM D2583: 55 (nom).
 - 7. Gardner Impact Strength, per ASTM D 3029: 120 in-lb (nom).
 - 8. Taber Abrasion Test: 0.029 average weight loss percentage (max).
 - 9. Stain Resistance: ASTM D1308: Face sheet unaffected.
 - 10. Chemical Resistance: ASTM D543. Excellent rating.
 - 11. Compressive Strength, Foam Core: ASTM D1621: 79.9 psi (nom).
 - 12. Compressive Modulus, Foam Core: ASTM D1621: 370 psi (nom).
 - 13. Tensile Adhesion, Foam Core, per ASTM D1623: 45.3 psi (nom).
 - 14. Thermal and Humid Aging, Foam Core, per ASTM D2126: Minus 5.14 percent volume change.

1.06 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.
- C. Shop Drawings: Indicate layout and profiles; include assembly methods.

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- 1. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
- 2. Indicate wall conditions, door and frame elevations, sections, materials, gages, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on drawings to identify details and openings.
- D. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.
- E. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Maintenance Data: Include instructions for repair of minor scratches and damage.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than 5 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.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store materials in original packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.
 - 1. Store at temperature and humidity conditions recommended by manufacturer.
 - 2. Do not use non-vented plastic or canvas shelters.
 - 3. Immediately remove wet wrappers.
- C. Store in position recommended by manufacturer, elevated minimum 4 inch (102 mm) above grade, with minimum 1/4 inch (6.4 mm) space between doors.

1.09 FIELD CONDITIONS

- A. Do not install doors until structure is enclosed.
- B. Maintain temperature and humidity at manufacturer's recommended levels during and after installation of doors.

1.10 WARRANTY

- A. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
 - 1. Warranty Period: Ten years from the date of Substantial Completion.
- B. Limited lifetime warranty covering failure of corner joinery, core deterioration, delamination or bubbling of door skin and corrosion of all fiberglass products.
- C. Finish Warranty;
 - 1. Anodized, aluminum:10 years.

PART 2 PRODUCTS

2.01 FRP/ALUMINUM HYBRID DOORS

A. Basis of Design Manufacturer: Subject to compliance with the Contract Documents, provide product from:

Special-Lite, Inc. P: (800) 821-6531 Web Site www.special-lite.com E-Mail info@special-lite.com Regional Sales Contact: Sal Donze (Kinstler & Assoc. / Lenexa, KS / (913) 591-2231)

B. Substitutions: Not permitted.

2.02 DOOR AND FRAME ASSEMBLIES

- A. Door and Frame Assemblies: Factory-fabricated, prepared and machined for hardware.
 - 1. Physical Endurance: Swinging door cycle test to ANSI/SDI A250.4, Level A (1,000,000 cycles) minimum; tested with hardware and fasteners intended for use on project.
 - 2. Clearance Between Door and Frame: 1/8 inch (3 mm), maximum.
 - 3. Clearance Between Meeting Stiles of Pairs of Doors: 1/8 inch (3 mm), maximum.
 - 4. Clearance Between Bottom of Door and Finished Floor: 3/4 inch (19 mm), maximum; not less than 1/4 inch (6 mm) clearance to threshold.
 - 5. Provide frame anchors that allow for variation in rough opening size; field cutting of doors or frames to fit is not permitted.

2.03 DESCRIPTION

- A. Basis of Design:
 - 1. Special Lite; SL-17 Pebble Grain FRP/ Aluminum Hybrid Door installed in aluminum framing.
- B. Construction:
 - 1. Thickness: 1-3/4 inch (44 mm), nominal.
 - 2. Door Size: Refer to Door Schedule.
 - 3. Stiles & Rails.
 - a. Aluminum extrusions made from 6063 aluminum alloys with a minimum temper of T5.
 - b. Minimum 2-5/16" deep one-piece extrusion with have integral reglets to accept face sheet on both interior and exterior side of door which secure face sheet into place and permit flush appearance.
 - c. Screw or snap in place applied caps are not acceptable.
 - d. Top rails must have integral legs for interlocking continuous extruded aluminum flush cap.
 - e. Bottom rails must have integral legs for interlocking continuous weather bar with single nylon brush weather stripping or manually adjustable SL-301 door bottom with two nylon brush weather stripping.
 - f. Meeting stiles to include integral pocket to accept pile brush weather seal.
 - 4. Core.
 - a. Poured-in-place polyurethane foam.
 - b. Laid in foam cores are not acceptable.
 - c. Foam Plastic Insulated Doors: IBC 2603.4.
 - 1) Foam plastic shall be separated from the interior of a building by an approved thermal barrier.
 - 2) Approved thermal barrier must meet the acceptance criteria of the Temperature Transmission Fire Test and Integrity Fire Test as stated in NFPA 275.
 - 3) IBC 2603.4.1.7 foam plastic insulation, having a flame spread index less than 75 and a smoke developed index of not more than 450 shall be permitted as a door core when the face is metal minimum 0.032" aluminum or 0.016" steel.
 - 4) Standard door assembly can be tested to show it meets these requirements without the use of thermal barrier. If no independent testing conducted all doors with foam plastic core must have a thermal barrier.
 - 5. Corner Joint Assemblies:
 - a. Mitered (Special-Lite):
 - 1) Corner joints secured with 3/8" diameter full-width steel tie rod through extruded splines top and bottom which are integral to standard tubular shaped rails.
 - 2) 1-1/4" x 1-1/4" x 3/16" 6061 aluminum angle reinforcement at corner to give strong, flat surface for locking hex nut to bear on.
 - 6. Reinforcement for Hardware: Reinforce stiles and rails to accept hardware as specified.

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FRP / ALUMINUM HYBRID DOORS WITH ALUMINUM FRAMES
- 7. Bottom of Door: Install bottom weather bar with nylon brush weather-stripping into extruded interlocking edge of bottom rail.
- C. Face Sheet:
 - 1. Material: Fiberglass reinforced polyester (FRP), 0.120-inch thickness, finish color throughout, Class C.
 - 2. Protective coating: Provide FRP with protective coating against normal weathering and normal usage.
 - 3. Texture:
 - a. SL-17: Patterned pebble embossed texture.
 - 4. Color: As selected by Architect from manufacturers standard colors.
 - 5. Attachment of Face Sheet: Extruded stiles and rails to have integral reglets to accept face sheet on both interior and exterior side of door which secure face sheet into place and permit flush appearance.
 - a. The use of glue to bond face sheet to core or extrusions is not acceptable.
- D. Core:
 - 1. Material: Injected-in-place polyurethane foam.
 - a. Laid in foam cores are not acceptable.
 - 2. Density: 5 pounds per cubic foot, minimum
 - 3. R-Value: 9.0, Minimum.
 - 4. ASTM E84: Class A.
- E. Cutouts:
 - 1. Manufacture doors with cutouts for required vision lites, louvers, and panels.
 - 2. Factory install vision lites, and panels.
 - 3. Vision Lites shall be located at least 8" from top of door, 12" from bottom of door, and 7" from the sides of the door to avoid door hardware.

2.04 HARDWARE:

- A. Refer to Section 08 71 00 Door Hardware.
- B. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.
- C. Pre-machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
- D. Factory install hardware.

2.05 MATERIALS

- A. Aluminum Members:
 - 1. Aluminum extrusions: 6063-T6 alloy per ASTM B221.
 - 2. Sheet and Plate: ASTM B209.
 - 3. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.
 - 4. Bars and Tubes to meet ASTM B221.
- B. Components: Door and frame components from same manufacturer.
- C. Fasteners:
 - 1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
 - 2. Compatibility: Compatible with items to be fastened.
 - 3. Exposed Fasteners: Screws with finish matching items to be fastened.

2.06 ALUMINUM DOOR FRAMING SYSTEMS

- A. Tubular Framing:
 - 1. Size and Type: 2-inches by 4 1/2-inches.
 - 2. Materials: Aluminum extrusions: 6063-T6 alloy, 1/8-inch minimum wall thickness.

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- 3. Applied Door Stops: 0.625-inch high, with screws and weatherstripping. Door stop shall incorporate pressure gasketing for weathering seal. Counterpunch fastener holes in door stop to preserve full metal thickness under fastener head.
- 4. Frame Members: Box type with 4 enclosed sides. Open-back framing is not acceptable.
- 5. Caulking: Caulk joints before assembling frame members.
- 6. Joints:
 - a. Secure joints with fasteners.
 - b. Provide hairline butt joint appearance.
- 7. Field Fabrication: Field fabrication of framing using stick material is not acceptable.
- 8. Applied Stops: For side, transom, and borrowed lites and panels. Applied stops shall incorporate pressure gasketing for weathering seal. Reinforce with solid bar stock fill for frame hardware attachments.
- 9. Hardware:
 - a. Premachine and reinforce frame members for hardware in accordance with manufacturer's standards and hardware schedule.
 - b. Factory install hardware.
- 10. Anchors:
 - a. Anchors appropriate for wall conditions to anchor framing to wall materials.
 - b. Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.
 - c. Secure head and sill members of transom, side lites, and similar conditions.
- 11. Side Lites:
 - a. Factory preassemble side lites to greatest extent possible.
 - b. Mark frame assemblies according to location.

2.07 FABRICATION

- A. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings.
- B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.
- C. Assembly:
 - 1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
 - 2. Remove burrs from cut edges.
- D. Welding: Welding of doors or frames is not acceptable.
- E. Fit:
 - 1. Maintain continuity of line and accurate relation of planes and angles.
 - 2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

2.08 FINISHES

- A. Doors:
 - Paint Finish: 70% KYNAR® or HYLAR® 5000 Coating, meets or exceeds all AAMA 2605 specifications, 2.5 to 4.0 wet mils,1.00 to 1.20 dry mils.
 a. Color: Consult Manufacturer.
- B. FRP Face Sheets:
 - 1. Through color.
 - a. Color: Manufacturer standard colors.
- C. Frame:
 - 1. Paint Finish: 70% KYNAR® or HYLAR® 5000 Coating, meets or exceeds all AAMA 2605 specifications, 2.5 to 4.0 wet mils,1.00 to 1.20 dry mils.
 - a. Color: Consult Manufacturer.

2.09 ACCESSORIES

- A. Stops for Glazing: Fiberglass, unless otherwise indicated or required by fire rating; provided by door manufacturer to fit factory made openings, with color and texture to match door; fasteners shall maintain waterproof integrity.
 - 1. Exterior Doors: Provide non-removable stops on exterior side with continuous compression gasket weatherseal.
 - 2. Glazed Openings: Provide removable stops on interior side.
 - 3. Opening Sizes and Shapes: As indicated on drawings.
- B. Glazing: As specified in Section 08 80 00.
- C. Door Hardware: As specified in Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Ensure openings to receive frames are plumb, level, square, and in tolerance.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.
- B. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place.
- C. Separate aluminum and other metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
- D. Set thresholds in bed of mastic and backseal.
- E. Install exterior doors to be weathertight in closed position.
- F. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- G. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.04 ADJUSTING

- A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.
- B. Adjust hardware for smooth and quiet operation.
- C. Adjust doors to fit snugly and close without sticking or binding.

3.05 CLEANING

A. Clean installed products in accordance with manufacturer's instructions.

3.06 PROTECTION

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

END OF SECTION

SECTION 08 31 00

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Wall and ceiling access door and frame units.

1.03 RELATED SECTIONS

A. Section 09 91 23 - Interior Painting: Field paint finish.

1.04 REFERENCE STANDARDS

1.05 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- D. Manufacturer's Installation Instructions: Indicate installation requirements.

1.06 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10C for fire-rated access door assemblies installed vertically.
 - 2. Provide smoke gasketing for doors in 0 or 1 hour rated smoke partitions.

2.02 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.03 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 - 2. Provide mounting holes in frames for attachment of units to metal framing.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.04 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

2.05 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Basis-of-Design Manufacturer and Product: Products from <u>Acudoor Products, Inc.</u> are specified to establish a standard of quality for design, function, materials, and appearance.
 - 1. Other Manufacturers: The following manufacturers are approved to provide materials or products that are equivalent to the "Basis of Design":
 - a. J. L. Industries, Inc. (Activar Construction Products Group)
 - b. Babcock-Davis
 - c. Cendrex, Inc.
 - d. Karp Associates, Inc.
 - e. Milcor Inc.
 - f. Nystrom, Inc.
 - 2. Substitutions: Refer to Section 01 25 00.

2.06 WALL-MOUNTED ACCESS DOORS / PANELS

- A. Wall-Mounted Units:
 - 1. Basis of Design: Acudoor, Model No. DW-5058.
 - 2. Location: As indicated on drawings.
 - 3. Material: Steel.
 - 4. Size: 12 inch by 12 inch (305 mm by 305 mm) unless noted otherwise.
 - 5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 6. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
- B. Fire-Rated Wall-Mounted Units:
 - 1. Basis of Design: Acudoor, Model No. FW-5015.
 - 2. Location: As indicated on drawings.
 - 3. Fire-Rating: As indicated on drawings, 2 hours or less.
 - 4. Material: Steel.
 - 5. Size: 12 inch by 12 inch (305 mm by 305 mm) unless noted otherwise.
 - 6. Door/Panel: Insulated double-surface panel, with tool-operated spring or cam lock and no handle.

2.07 CEILING-MOUNTED ACCESS DOORS / PANELS

A. Ceiling-Mounted Units:

- 1. Basis of Design: Acudoor, Model No. DW-5058.
- 2. Location: As indicated on drawings.
- 3. Material: Steel.
- 4. Size Lay-In Grid Ceilings: To match module of ceiling grid.
- 5. Size Other Ceilings: 12 inch by 12 inch (305 mm by 305 mm) unless noted otherwise.
- 6. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
- B. Fire-Rated Ceiling-Mounted Units:
 - 1. Basis of Design: Acudoor, Model No. FWC-5015.
 - 2. Location: As indicated on drawings.
 - 3. Fire-Rating: As indicated on drawings, 2 hours or less.
 - 4. Material: Steel.
 - 5. Size: 12 inch by 12 inch (305 mm by 305 mm) unless noted otherwise.
 - 6. Door/Panel: Insulated double-surface panel, with tool-operated spring or cam lock and no handle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

3.04 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08 43 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Exterior aluminum storefront framing for window walls and/or punched openings.
- B. Exterior entrance doors and frames.

1.03 RELATED SECTIONS

- A. Section 06 10 00 Rough Carpentry
- B. Section 07 62 00 Sheet Metal Flashing and Trim
- C. Section 07 92 00 Joint Sealants
- D. Section 08 71 00 Door Hardware.
- E. Section 08 80 00 Glazing

1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - 2. Dimensional tolerances of building frame and other adjacent construction.
 - 3. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Glazing-to-glazing contact.
 - e. Noise or vibration created by wind and by thermal and structural movements.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
 - h. Failure of operating units.
- B. Delegated Design: Design storefront systems, including comprehensive engineering analysis by a qualified professional engineer, using the following design criteria:
 - 1. Structural load information: Based on the 2012 International Building Code and the structural drawings.
- C. Performance Requirements:
 - 1. Air Infiltration Test: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E283, at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
 - a. Air infiltration shall not exceed 0.06 cfm/sq. ft. (0.03 L/s per sq. m)
 - 2. Water Resistance Test
 - a. Test unit in accordance with ASTM E331.
 - b. There shall be no uncontrolled water leakage at a static test pressure of 12.0 psf (575 Pa).
 - 3. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa)].

- a. Maximum Water Leakage: According to AAMA 501.1 No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.
- 4. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): 0 deg F (-18 deg C); 180 deg F (82 deg C), material surfaces.
 - b. Test Interior Ambient-Air Temperature: 75 deg F (24 deg C).
 - c. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum 3 cycles.
- 5. Condensation Resistance (CR): Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.
- 6. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.47 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) when tested according to AAMA 1503 with Low-e glass.
- 7. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:
 - a. Sound Transmission Class (STC): Minimum 38 STC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.
 - b. Outdoor-Indoor Transmission Class (OITC): Minimum 31 OITC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E1332.
- 8. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - a. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - b. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
- 9. Structural-Sealant Joints: Designed to produce tensile or shear stress of less than 20 psi (138 kPa).

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
- B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
 - 2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

- E. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch (300-mm) lengths of full-size components and showing details of the a) Joinery (including concealed welds); b) anchorage; c) expansion provisions; d) glazing; e) flashing and drainage.
- F. Other Action Submittals:
 - 1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- G. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of aluminum-framed systems.
 - 2. Include design calculations.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.
- B. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- C. Welding certificates.
- D. Preconstruction Test Reports: For sealant.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Warranties: Sample of special warranties.

1.07 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.08 QUALITY ASSURANCE

- A. Test reports shall be accompanied by the storefront manufacturer's letter of certification stating that the tested storefront meets or exceeds the requirements of the 2015 IECC.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- D. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- E. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

- F. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.
- G. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
- H. Structural-Sealant Glazing: Comply with ASTM C1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
- I. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.
- J. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.09 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Installation Warranty: The responsible contractor shall assume full responsibility during the warranty period for the satisfactory performance of the total storefront installation.
 1. Warranty Period: One (1) year from Date of Substantial Completion.
- B. Manufacturer Warranty: Manufacturer shall warrant the product/s, including aluminum finish, to be free of defects in material and workmanship for a period of three (3) years from Date of Substantial Completion.
- C. Glass Warranty: Warrant the insulated glass units will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship during the warranty period.
 - 1. Warranty Period: Ten (10) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Products from Kawneer Corporation are specified to establish a standard of quality for design, function, materials, and appearance.
 - 1. Other Manufacturers: The following manufacturers are approved to provide materials or products that are comparable to the "Basis of Design":
 - a. Tubelite
 - b. EFCO Corporation
 - c. Manko Window Systems, Inc
 - d. Special-Lite

2.02 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and complying with ASTM B221: 6063-T6 alloy and temper.
- B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.
- C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

- E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.03 EXTERIOR STOREFRONT FRAMING SYSTEM

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads:
 - 1. Basis of Design Product: Kawneer Tri-Fab VG 451T, Thermally broken storefront system.
- B. Properties:
 - 1. System Dimensions: 2 inch x 4-1/2 inches (50.8 mm x 114.3 mm)
 - 2. Glazing Plane: Exterior.
 - 3. Glazing System: Retained mechanically with gaskets on four sides.
 - 4. Kawneer IsoLock[™] Thermal Break with a 1/4" (6.4 mm) separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
 - a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
- E. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
 - 1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.04 MATERIALS

- A. Aluminum
 - 1. Extruded aluminum shall be 6063-T6 alloy and temper.
- B. Glazing: Refer to Section 08 80 00.
- C. Thermal Barrier:
 - 1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
 - 2. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.
- D. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
- E. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- F. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- G. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
 - 1. Structural Sealant: ASTM C1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically

formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.

a. Color: Black

- 2. Weatherseal Sealant: ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - a. Color: Matching structural sealant.

2.05 ENTRANCE DOORS

- A. Entrance Doors: Manufacturer's glazed full-lite entrance doors, manual-swing operation.
 1. Product: Kawneer 500 Swing Door, Wide stile.
- B. Properties:
 - 1. Overall thickness: 1 3/4-inches, with minimum 0.125-inch thick extruded-aluminum tubular rail and stile members.
 - 2. Medium Stile Doors:
 - a. Vertical Stiles: 3-1/2 inches wide.
 - b. Top Rail: 5-inches high.
 - c. Bottom Rail: 6-1/2 inches high.
 - d. Intermediate Rail for mounting of panic hardware: 8-1/4 inches high.
 - 3. Glazing Stops and Gaskets: Square, extruded-aluminum stops shaped to accommodate 1/4-inch or 1-inch glazing with manufacturer's standard glazing gaskets.
 - a. Provide non-removable glazing stops at exterior side of doors and storefronts.
- C. Entrance Door Hardware: As specified below.

2.06 DOOR HARDWARE

- A. General: Provide entrance door hardware sets specified in Section 08 71 00.
 - 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Opening-Force Requirements:
 - 1. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N)to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
 - 2. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

2.07 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07 92 00 Joint Sealants.
 - 1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

2.08 FINISHES

- A. Kawneer Permanodic[™] AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating.
 - 1. Color: Champagne

2.09 FABRICATION

A. General

- 1. All aluminum frame extrusions shall have a minimum wall thickness of .080-inches (2 mm).
- 2. All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.
- B. Exterior Frame
 - 1. Depth of frame shall not be less than 4-1/2 inches (114 mm).
 - 2. Face dimension shall not be less than 2-inches (50 mm).
 - 3. Frame components shall be shear block construction.
- C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- F. Storefront Framing: Fabricate components for assembly using shear-block system.
- G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At exterior doors, provide compression weather stripping at fixed stops.
 - 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.

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- 4. Rigidly secure nonmovement joints.
- 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
- 6. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 Joint Sealants to produce weathertight installation.
- E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
- F. Install glazing as specified in Section 08 80 00.
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- H. Install perimeter joint sealants as specified in Section 07 92 00 Joint Sealants to produce weathertight installation.

3.03 ERECTION TOLERANCES

- A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
 - 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
 - 2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
- B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide periodic site visit by manufacturer's field service representative.

3.05 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
- B. Clean aluminum surfaces immediately after installing aluminum-framed entrance doors. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect installed systems from damage.

END OF SECTION

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ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

SECTION 08710 - FINISH HARDWARE

PART 1 - GENERAL

1.1 The Requirements

A. As set forth in the headings of General Conditions, Supplementary General Conditions, and Division1, General Requirements shall apply to this branch of the work.

1.2 Summary

- A. Intent: The intent of this Section is to provide finish hardware for the proper operation and control of all wood, hollow metal and aluminum doors in the Project. Prior to bidding, notify the Architect of any doors that do not have hardware meeting this intention.
- B. The hardware supplier will be responsible to furnish correct hardware on labeled doors to satisfy State and Local Building Codes.
- C. Should items of hardware, not definitely specified, be required for completion of work, furnish such items of type and quality suitable to the services required and comparable to the adjacent hardware.
- D. Related work in other sections:
 - 1. Hollow metal doors; frames and silencers: Section 08100.
 - 2. Wood doors: Section 08210.
 - 3. Aluminum doors: Section 0840.

1.3 Submittals

- A. Comply with requirements of the Conditions of the Contract and Section 01300.
- B. Product Data: Submit manufacturer's technical product data for each hardware item. Include information necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and finishes.
- C. Hardware Schedule: Submit a hardware schedule in a vertical format (horizontal format not acceptable), organized into sets, including the information below. Designations for door numbers and hardware sets in the schedule shall match those used in the Construction Documents.
 - 1. Hardware Schedule shall be coordinated with doors, frames, and related work to ensure proper size, thickness, hand function, and finish of door hardware. Provide index at end of submittal listing door and-specified hardware. In addition, indicate page on submittal where door is found.
 - 2. Catalog cuts of each type of exposed hardware unit, highlighted in color to indicate compliance with the Hardware Schedule.
 - a. Type, style, function, size send finish of each hardware item.

- b. Name and manufacturer of each item.
- c. Fastenings and other pertinent information.
- d. Explanation of all abbreviations, symbols, codes, etc., contained in schedule.
- e. Mounting locations for hardware.
- f. Door and frame sizes and materials.
- g. Deviations from Specifications shall be noted in cover letter.
- 3. 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 and firmware. 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.
- 4. Electrical Coordination: Coordinate with related Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames), which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- E. Keying Schedule: Submit separate detailed schedule indicating keying for all locks. Keying schedule must be approved before ordering any locks.
- F. Templates: Furnish hardware templates to each fabricator of doors, frames and other work. To be factory-prepared for the installation of hardware: Upon request check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

1.4 Quality Assurance

- A. Supplier Qualifications: A recognized Architectural Finish Hardware Supplier, with warehousing facilities, who has been furnishing hardware in the Project's vicinity for a period of not less than two (2) years. Supplier shall be or employ an experienced Architectural Hardware Consultant (AHC) who is certified by and member of the Door and Hardware Institute. The Architectural hardware Consultant shall be available, at reasonable times during the course of the work, for consultation about Project's hardware requirements, to Owner, Architect and Contractor.
- B. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80, No. 101 and local building code requirements. Provide only hardware, which has been tested and listed, by UL, FM or Warnock Hersey for types and sizes of doors required and complies with requirements of door and door frame labels.

- 1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL or FM labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL or FM label on exit devices indicating "Fire Exit Hardware".
- C. Standards: Comply with the requirements of the latest edition of the following standards, unless indicated otherwise:
 - 1. American National Standards Institute (ANSI) Publications:
 - a. A115 Series Door and Frame Preparation
 - b. A156 Series -Hardware
 - 2. Builders Hardware Manufacturers Association (BHMA) Publications:
 - a. 1201- Auxiliary Hardware
 - b. 1301 Materials and Finishes
 - 3. Door and Hardware Institute (DHI) Publications:
 - a. Keying Procedures, Systems, and Nomenclature
 - b. Abbreviations and Symbols
 - c. Hardware for Labeled Fire Doors
 - d. Recommended Locations for Builder's Hardware for Standard and Custom Steel Doors and Frames
 - e. Wood Door Standards W1, W2, WDHS-2 WDHS-3
 - 4. National Fire Protection Association (NFPA) Publications:
 - a. NFPA Pamphlet No. 80 Standards for Fire Doors and Windows.
 - b. NFPA Pamphlet No. 101.
 - 5. International Building Code 2009 Edition.
 - 6. Americans with Disabilities Act (ADA).
 - 7. ANSI A117.1

1.5 Deliveries, Storage and Handling

- A. Package each hardware item in separate containers with all screws, wrenches, installation instructions and installation templates. Mark each box with hardware heading and door number according to approved hardware schedule.
- B. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation: Provide a complete packing list showing items, door numbers and hardware headings with each shipment.
- C. Store hardware in shipping cartons above ground and under cover to prevent damage. Provide secure lockup for door hardware delivered to the Project, but not yet installed. Control handling

and installation of hardware items that are not immediately replaceable -so that completion of the Work will not be delayed by hardware losses both before and after installation.

D. Aluminum Door Hardware: Deliver hardware for aluminum doors as directed by the door supplier.

1.6 Coordination

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- C. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- D. Coordinate quantity and arrangement of assemblies with ceiling space configuration and with components occupying ceiling space, including structural members, pipes, air-distribution components, raceways, cable trays, recessed lighting fixtures, and other items.
- E. Access Control System Electrical Coordination: Coordinate the layout and installation of scheduled electrified door hardware, and related access control equipment, with required connections to source power junction boxes, power supplies, detection and monitoring hardware and fire alarm system.

1.7 Scope of Work

- A. Furnish and install at the indicated locations the specified electrified and integrated door hardware and access control firmware and software for a completely operational access control system. System includes, but is not necessarily limited, to the following:
 - 1. Electrified integrated card reader locks and exit hardware, door position switches, remote card readers, keypads, access cards and credentials, system application software, special tools, operating manuals, and required cabling and accessories as detailed below and listed in the Hardware Sets at the end of Part 3.

PART 2 - PRODUCTS

2.1 Hardware – General

- A. Provide the materials or products indicated by trade names, manufacturer's name, or catalog number. Substitutions will not be permitted except as described in Section 01630.
- B. Provide manufacturer's standard products meeting the design intent of this Specification, free of imperfections affecting appearance or serviceability.

- 1. Provide hardware complete with all fasteners, anchors, instructions, layout templates, and any specialized tools as required for satisfactory installation and adjustment.
- 2. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown
- 3. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated or approved. Finish screws exposed under any condition to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible. Use machine screws for metal connections and wood screws for connections to wood. Use manufacturer's screws to secure hardware.
- 4. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt, head or nut on opposite face is exposed in other work, except where indicated otherwise or where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.
- 5. Special Tools: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.
- C. Hardware is specified in the hardware schedule by set, type, and functions, which have been selected as best meeting the application requirements. Acceptable products for each category are specified in Paragraph 2.5, "Hardware Products".

2.2 Products

- A. Hinges:
 - 1. Manufacturers:
 - a. Scheduled Manufacturer: Ives.
 - b. Acceptable Manufacturers: Bommer, Hagar.
 - 2. Requirements:
 - a. Provide non-removable pins for all exterior doors and all interior out-swining corridor doors. Use non-rising pins for all other doors.
 - b. Provide continuous hinge at exterior doors.
 - c. Provide heavy weight hinges.
 - d. Hinges shall be sized in accordance with the following:
 - Height: Doors up to 36" wide: 4-1/2" inches. Doors 36" to 48" wide: 5 inches.
 - Width: Sufficient to clear frame and trim when door swings 180 degrees.

- Number of Hinges: Furnish 3 hinges per leaf to 7'-6" in height. Add one hinge for each additional 30 inches of height.

- B. Locksets:
 - 1. Manufacturers:

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- a. Scheduled Manufacturer: Schlage ND Series / Schlage L Series. No substitution.
- 2. Requirements:
 - a. All locksets to be grade 1 heavy duty cylindrical or mortise as specified.
 - b. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.
 - c. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 - d. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 - e. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 - f. Provide electrified options as scheduled in the hardware sets.
 - g. Provide lead lined locksets where specified.

C. Exit Devices:

- 1. Manufacturers:
 - a. Scheduled Manufacturer: Von Duprin 98/99 Series. No substitution.
- 2. Requirements:
 - a. All latchbolts to be deadlatching type.
 - b. All touchbars to be stainless steel. Touchpad to extend minimum one half of the door width. Provide exit devices with flush and tapered endcap.
 - c. Where lever handles are specified as outside trim for exit devices, provide heavyduty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
 - d. Provide UL labeled fire exit hardware for fire rated openings.
 - e. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion that is removed by use of a keyed cylinder, which is self-locking when re-installed.
 - f. Concealed vertical cable devices shall be provided on exterior doors without mullions. Device to have top and bottom latch that operate independently of each other.
 - g. Provide electrified options as scheduled in the hardware sets. Electronic latch retraction shall be quiet motorized design rather that solenoid driven.

D. Closers:

- 1. Manufacturers:
 - a. Scheduled Manufacturer: LCN 4050 Series. No Substitution.
- 2. Requirements:

- a. Comply with manufacturer's recommendations for unit size based on door size, weather exposure and usage.
- b. Provide parallel arms for all overhead closers, except as otherwise indicated.
- c. All Closers UL Certified to be in compliance with UBC 7.2 and UL 10C.
- d. Closers with Pressure Relief Values will not be acceptable.
- e. Provide any brackets or plates required for proper installation of door closers.
- f. Closer cylinders, arms, adapter plates, and metal covers shall have a powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117.
- E. Automatic Operators:
 - 1. Manufacturers:
 - a. Scheduled Manufacturer: LCN.
 - b. Acceptable Manufacturers: Horton, Record.
 - 2. Requirements:
 - a. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
 - b. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories and sensors.
 - c. Provide drop plates, brackets, or adapters for arms as required to suit details.
 - d. Provide hard-wired motion sensors and/or actuator switches for operation as specified.
 - e. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
 - f. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Locate actuators, key switches, and other controls as directed by Architect.

F. Door Trim

- 1. Manufacturers:
 - a. Scheduled Manufacturer: Ives.
 - b. Acceptable Manufacturers: Burns, Rockwood.
- 2. Requirements:
 - a. Provide pulls of solid bar stock, diameter and length as scheduled. Where thrubolted provide decorative fastener.

- b. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
- G. Protection Plates
 - 1. Manufacturers:
 - a. Scheduled Manufacturer: Ives.
 - b. Acceptable Manufacturers: Burns, Rockwood.
 - 2. Requirements:
 - a. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick as scheduled. Plates shall be beveled 4 edges with countersunk screws. Furnish with sheet metal or wood screws, finished to match plates.
 - b. Kick Plates: 10 inches high by 2 inches less width of door on single doors, 1 inch less width of door on pairs.
 - c. Armor Plates: 34 inches high by 2 inches less width of door on single doors, 1 inch less width of door on pairs. Provide UL labeled armor plates.
- H. Overhead Stops and Holders
 - 1. Manufacturers:
 - a. Scheduled Manufacturers: Glynn-Johnson
 - b. Acceptable Manufacturers: Rixson, ABH
 - 2. Requirements:
 - a. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
- I. Door Stops and Holders
 - 1. Manufacturers:
 - a. Scheduled Manufacturer: Ives.
 - b. Acceptable Manufacturers: Burns, Rockwood.
 - 2. Provide door stops at each door leaf:
 - 3. Provide wall stops wherever possible. Provide concave type where cylindrical type locks are used.
 - 4. Where a wall stop cannot be used, provide overhead stop..
- J. Thresholds, Seals, and Gasketing
 - 1. Manufacturers:
 - a. Scheduled Manufacturer: Zero.

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- b. Acceptable Manufacturers: NGP, Reese.
- 2. Requirements:
 - a. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
 - b. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
 - c. Provide intumescent seal where required by door/frame manufacturer.
- K. Silencers
 - 1. Manufacturers:
 - a. Scheduled Manufacturer: Ives.
 - b. Acceptable Manufacturers: Burns, Rockwood.
 - 2. Requirements:
 - a. Provide "push-in" type silencers for hollow metal or wood frames.
 - b. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
 - c. Omit where gasketing is specified.
- L. Magnetic Holders
 - 1. Manufacturers:
 - a. Scheduled Manufacturer: LCN.
 - b. Acceptable Manufacturers: Rixson, Sargent.
 - 2. Requirements:
 - a. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordination projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Wire magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.3 Keying

- A. Cylinders to Schlage Everest to match Owner's existing system.
- B. Furnish cylinders in Small Format Interchangable Core (SFIC). Pack change keys independently (PKI).
- C. Construction Cores Provide temporary construction cores for all openings.
- D. Key all locks separately, or alike, as directed by the Owner's representative and Architect. Keying schedule must be approved by Owner prior to ordering permanent cores.

- E. Copies of final key schedule with the bitting instructions shall be submitted as part of the Project Record Documents.
- F. Provide keys as follows:
 - 1. Change keys: 2 per lock.
 - 2. Master keys: 6 required (per system).
 - 3. Permanent Control Keys: 3.
 - 4. Construction Master Keys: 10.
- G. Identification: Stamp all (master-type) keys with the following:
 - 1. "Do Not Duplicate".
 - 2. Key change number (all keys).

2.4 Key Control System

- A. Key Control System Manufacturers:
 - 1. Scheduled Manufacturer: Telkee
 - 2. Acceptable Manufacturers: HPC, Lund
- B. Requirements:
 - 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - 2. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - 3. Provide hinged-panel type cabinet for wall mounting.

2.5 Wiring, Cable, and Connectors

- A. Connectors: Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with sufficient number and wire gauge with standardized Molex plug connectors to accommodate electric function of specified hardware. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.
- B. Provide and Install appropriate number of conductor pairs, in the wire gage (AWG) recommended by manufacturer, corresponding to the electronic locking functions specified, amperage drawn and distances covered between the power supplies, power transfer devices, electrified hardware and access control equipment.

2.6 Hardware Finishes

- A. Provide matching finishes for hardware units at each door to the greatest extent possible, unless otherwise indicated. In general, match items to the finish for the latch, lock or push pull unit for color and texture.
- B. Hardware finishes as follows:
 - 1. 626 Satin Chrome-plated.
 - 2. 630 Satin Stainless Steel

PART 3 - EXECUTION

3.1 Preparation

- A. Carefully inspect doors, and conditions under which hardware will be installed. Notify the Architect of any conditions that would adversely affect the installation or subsequent door operation. Do not proceed until unsatisfactory conditions are corrected.
- B. Prior to hardware installation, the General Contractor shall setup a meeting with the Hardware Supplier and the Hardware installer to ensure the installer has and understands the manufacturer's installation requirements for all hardware items.
- C. The Supplier shall observe the installation of the first lockset, closer, and exit device.

3.2 Installation

- A. Mount Hardware units at heights indicated in respective DHI Standards, except as specifically indicated, or required to comply with governing regulations, and except as may be otherwise directed by the Architect.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces, which are later to be field, finished, coordinate removal, storage and reinstallation or application of surface protections with finishing work. Do not install surface-mounted items until finishes have been completed on substrate.
- C. Set units level, plumb and true to line and location. Adjust and reinforce the attachments substrate as necessary for proper installation and operation.
- D. Provide fasteners and anchoring devices of suitable size, quantity and type to secure hardware in proper position for heavy use and long life.
 - 1. Drill and countersink unit, which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards
- E. Adjust door closers immediately upon installation. Adjust in exact conformance with manufacturer's printed instructions. Advance backcheck to eliminate shock at dead stop. Set closer latching speed to assure unassisted positive latching.
 - 1. Degree of swing of door for self-limiting closers shall be maximum available.

- F. Adjust all exit devices immediately upon installation. Adjust in exact conformance with manufacturers' printed instructions.
- G. Install each protection plate with a thinly spread of mastic at its center to assure even contact before fastening with screws. Install all such plates on visual center of closed doors. Set bottom edges of all such plates flush with door bottom.
- H. Seal weather protection components attached to the exterior sides of doors and frames, such as drip caps and weather-stripping, in place with clear silicone caulk in such a manner as to ensure a continuously filled seam throughout the joinery.
- I. Cut and fit weatherstripping accurately to provide the greatest possible continuity of the contact element. Adjust closer template as required.

3.3 Adjust and Clean

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units, which cannot be adjusted to operate freely and smoothly as intended for the applications made.
- B. Clean adjacent surfaces soiled by hardware installation
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.4 Instructions and Inspection

- A. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- B. After hardware is installed and adjusted, the Supplier shall inspect the job with the Architect and the General contractor to determine if the hardware is functioning properly.
 - 1. Maintain the instruction sheets, layout templates, and any supplementary literature regarding hardware in a readable condition. Transmit all such items to the Owner's Representative, together with all spare parts, specialized tools, other accessories supplied with the hardware, and a copy of the approved hardware schedule at the time of instruction.

HARDWARE SCHEDULE

HARD DOOR	WARE NUMB	SET: 1 ER:			
EACH	ТО НА	VE:			
OTY	,	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4 5 X 4 5	652	IVE
1	SET	CONST LATCHING BOLT	FB52	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96HD SPA	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	OH STOP	90S	630	GLY
2	EA	SURFACE CLOSER	4011 DEL	689	LCN
2	EA	ARMOR PLATE	8402 34" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
2	EA	MEETING STILE	8195AA	AA	ZER
HARD DOOR 1303	WARE NUMB	SET: 2 ER: 1304			
EACH	TO HA	VE:			
QTY	r	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70HD SPA	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	SILENCER	SR64	GRY	IVE
HARD DOOR	WARE NUMB	SET: 3 ER:			
EACH	TOHA	VE			
OTY	, , , , , , , , , , , , , , , , , , , ,	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
211	FΔ	PIVOT SFT	7215 SFT	626	IVF
1	ΕΔ	DOOR PLIL 1" FLAT	8105 10" STD	630	IVE
1	LA	DOORTOLL, I TEAT	(ACTIVE I FAF)	050	IVL
1	FΔ	PUSH PLATE	8200 4" X 16"	630	IVF
1	LA	TUSHTEATE	(ACTIVE I FAF)	050	IVL
1	FΔ	COORDINATOR	CORXEL	628	IVF
1	EA	SURF AUTO OPERATOR	9553	ANCI R	LCN
2	EA	TOUCHI ESS ACTUATOR	8310-813	630	LCN
$\frac{2}{2}$	EA	ARMOR PLATE	8400 34" X 1" LDW B-CS	630	IVF
1	ΕΛ	GASKETING	488SBK PSA	RK	7FR
1	1.11	STICKET IN C	(HEAD, JAMBS, ASTRAGAL)	DIX	
1	EA	ASTRAGAL	LEAD LINED BY DOOR SUPPLIER		

HARD	WARE	SET: 4			
DOOR	NUMB	ER:			
1301					
EACH	TO HA	VE:			
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC FIRE EXIT	QEL-9927-EO-F-LBR-499F	626	VON
		HARDWARE			
1	EA	ELEC FIRE EXIT	QEL-9927-L-BE-F-LBR-17-499F 24	626	VON
		HARDWARE	VDC		
1	EA	SURF. AUTO OPERATOR	9553	ANCLR	LCN
2	EA	TOUCHLESS ACTUATOR	8310-813	630	LCN
1	EA	SAFETY SENSOR	8310-877		LCN
2	EA	ARMOR PLATE	8402 34" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
2	EA	MEETING STILE	8195AA	AA	ZER
1	EA	POWER SUPPLY	PS904 900-4RL-FA 120/240 VAC	LGR	SCE
2	EA	CARD ACCESS	BY SECURITY CONTRACTOR		B/O
1	EA	WIRING DIAGRAM	BY SECURITY CONTRACTOR		B/O

OPERATION: DOORS NORMALLY CLOSED, PANICS DOGGED (MADE PUSH/PULL) ELECTRONICALLY. PRESSING ACTUATOR OPENS DOOR. UPON FIRE ALARM OR LOSS OF POWER DOORS TO CLOSE AND LATCH. ALWAYS FREE EGRESS.

HARDWARE SET: 5

DOOR NUMBER:

1303.1

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PIVOT SET	7215 SET	626	IVE
1	EA	PASSAGE SET	ND10S SPA XN12-307	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 6

DOOR NUMBER:

1307

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70HD SPA	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4111 CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 7 DOOR NUMBER: 1301.1 EACH TO HAVE: QTY DESCRIPTION 1

CATALOG NUMBER EXISTING DOOR, FRAME AND HARDWARE FINISH MFR

END OF SECTION

SECTION 08 80 00 GLAZING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Glass types including the following:
 - 1. Monolithic glass.
 - 2. Laminated glass units.
 - 3. Insulating glass units without solar control coatings.
 - 4. Radiation Shielding Glass

1.03 RELATED SECTIONS

- A. Section 08 11 13 Hollow Metal Doors and Frames
- B. Section 08 14 16 Flush Wood Veneer Doors
- C. Section 08 41 23 Fire-Rated Aluminum Framed Entrances and Storefronts
- D. Section 08 41 25 Fire-Rated Steel Entrances and Framing Systems
- E. Section 08 81 17 Fire-Rated Glass

1.04 REFERENCES

- A. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings
- B. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials
- C. GANA Glazing Manual.
- D. FGMA Sealant Manual.

1.05 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ICC's 2015 International Building Code by a qualified professional engineer, using the following design criteria:
 - 1. Design Wind Pressures, Indoors Only: 5 pounds.
 - 2. Design Wind Pressures, Exterior: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Wind Design Data: As indicated on Drawings.
 - b. Basic Wind Speed: 120 mph.
 - c. Importance Factor: 1.0.
 - d. Exposure Category: C.
 - 3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 - 4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
 - 5. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.06 SUBMITTALS

- A. Samples: Submit 12-inch by 12-inches (305mm by 305mm) samples of each type of glass indicated, except for clear monolithic glass products.
- B. Test and Evaluation Reports: Glazing contractor shall obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant as well as other glazing materials including insulating units.
- C. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Product Data: Manufacturer's data sheets for each product specified, including but not limited to:
 - 1. Performance characteristics.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
 - 5. Cleaning methods.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.07 QUALITY ASSURANCE

- A. Source Limitations for Glass: Obtain tinted float glass, coated float glass, insulated glass, laminated glass and clear glass from single source from single manufacturer for each glass type.
- B. Qualifications:
 - 1. Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with a minimum of ten (10) years of fabrication experience and meet ANSI / ASQC 9002 1994.
 - 2. Fabricator's Qualifications: Certified by AGC Glass Company to fabricate solar control coated glass products.
 - a. Minimum of 5 years experience manufacturing sealed insulating glass units meeting ASTM E 2190.
 - b. Minimum of 5 years experience manufacturing laminated glass units meeting ASTM C 1172 and CPSC 16 CFR-1201.
- C. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 SEQUENCING AND SCHEDULING

A. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.11 WARRANTY

- A. Manufacturer's Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from Date of Substantial Completion.
- B. Manufacturer's Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: 10 years from Date of Substantial Completion.
- C. Manufacturer's Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Specified Manufacture: AGC Glass Company; North America.
 1. Contacts: P: 800-251-0441; Email: info@us.agc.com; Web: www.agcglass.com
- B. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - 1. Viracon
 - 2. Insulite Glass Company.
 - 3. AGC Glass North America, Inc.
 - 4. Cardinal Glass Industries.
 - 5. Oldcastle.
 - 6. Guardian Glass, LLC.
 - 7. Vitro Architectural Glass.
- C. Radiation Shielding Glass:
 - 1. Corning Inc; Med-X.
 - 2. SCHOTT North America Inc.

2.02 PERFORMANCE REQUIREMENTS

- A. Provide glazing systems capable of withstanding normal thermal movements, wind loads and impact loads, without failure, including loss due to defective manufacture, fabrication and installation; deterioration of glazing materials; and other defects in construction.
- B. Safety Glazing: Where safety glazing is indicated, comply with testing requirements in 16 CFR 1201 for Category II materials.
- C. Delegated Design: Design glass installed adjacent to walking surfaces, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - 1. Differential deflection of adjacent unsupported edges shall not exceed glass thickness when subjected to 50 lbf/ft (730 n/m) applied horizontally to one panel at any point up to 42 inches (1067 mm) above the adjacent walking surface.
 - 2. Base design on thickness at thinnest part of the glass.

2.03 GLASS PRODUCTS

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
- B. Glass Strength:
 - 1. Where float glass is indicated, provide annealed float glass, Kind HS heat strengthened float glass, or Kind FT fully tempered treated float glass as needed to comply with requirements indicated.
 - 2. Where heat treated glass is indicated, provide Kind HS heat strengthened float glass or Kind FT fully tempered float glass as needed to comply with requirements indicated.
 - 3. Where fully tempered glass is indicated, provide Kind FT fully tempered float glass.
- C. Heat-Treated Float Glass: ASTM C 1048, ASTM C 1036; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.04 LAMINATED GLASS

- A. Laminated Glass shall comply with ASTM C1172, and with testing requirements in 16 CFR 1201 and ANSI Z97.1 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral (PVB) interlayer to comply with interlayer manufacturer's written recommendations.
 - 2. Polyvinyl Butyral (PVB) Interlayer:
 - a. Product::
 - 1) Viracon; "Vanceva® Color Interlay System".
 - b. Thickness: 0.060 inch (1.524 mm).
 - 1) Provide thickness not less than that indicated and as needed to comply with requirements.
 - c. Interlayer Color:
 - 1) Clear, unless otherwise indicated.
 - 2) Colored. Refer to "Glazing Types Schedule"
 - (a) Color/s to be selected from Manufacturer's standard colors.
 - (b) A single color can be selected or the base interlayers can be stacked to provide the specific color and opacity desired. Up to four interlayers* can be stacked between two plies of glass within a laminated glass unit.
 - (1) Coated glass requires a clear pvb interlayer between the coating and a colored interlayer.

2.05 INSULATING GLAZING UNITS

- A. Description: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, in accordance with ASTM E2190, and other requirements specified.
 - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
 - Metal Edge Spacers: Aluminum, bent and soldered corners.
 a. Spacer Color: Anodized Aluminum.
 - 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- B. Solar Control Insulating Vision Glazing Units Assembly:
 - 1. Overall Unit Thickness: 1-inch (25mm) unless indicated otherwise.
 - 2. Makeup:
 - a. Outboard Lite: Clear or Tinted float glass.
 - 1) Thickness: 1/4-inch unless otherwise indicated.
 - 2) Glass Type: Annealed (AN), Fully-Tempered (FT), or Heat-Strengthened (HS) Float Glass.
 - 3) Glass Coatings: Low-E (Surface 2), Reflective (Surface 2), or Uncoated.
 - b. Interspace: 1/2-inch clear air space with spacer.
 - c. Inboard Lite: Clear float glass.
 - 1) Thickness: 1/4-inch unless otherwise indicated.
 - 2) Glass Types: Annealed (AN), Fully-Tempered (FT), or Heat-Strengthened (HS).
 - 3. Provide safety glazing labeling where necessary.
- C. Laminated Solar Control Insulating Vision Glazing Units Assembly:
 - 1. Overall Unit Thickness: 1-5/16 inches (34 mm) unless indicated otherwise.
 - 2. Makeup:
 - a. Outboard Lite: Clear or Tinted Float Glass.
 - 1) Thickness: 1/4-inch unless otherwise indicated.
 - 2) Glass Type: Annealed (AN), Fully-Tempered (FT), or Heat-Strengthened (HS).
 - 3) Glass Coatings: Low-E (Surface 2), Reflective (Surface 2), or Uncoated.
 - b. Interspace: 1/2-inch clear air space with spacer.
 - c. Inboard Lite: Clear, Laminated (LAM) Float Glass, 2 Plies
 - 1) Glass Thickness: Each Ply: 1/4-inch.
 - 2) Glass Types: Annealed (AN), Fully-Tempered (FT), or Heat-Strengthened (HS).
 - 3) PVB Interlayer: 0.060-inch thickness.
 - 3. Provide safety glazing labeling where necessary.

2.06 COATED VISION GLASS (LOW-E)

- A. Product: AGC; "Energy Select 28, High-Performance; Triple-Silver Low-E Coated Glass.
 - 1. Substrate: 1/4-inch thick clear glass.
 - 2. Coating Position: Surface 2.
 - 3. Color: Neutral.
- B. Performance Characteristics: Based on 1-inch (6mm) insulating glazing unit assembly described in Heading 2.06 this Section.
 - 1. Transmittance (%):
 - a. Visible Light Transmittance (VLT): 62-percent.
 - b. Solar Transmittance: 24-percent.
 - c. UV Transmittance: 15-percent.
 - 2. Visible Light Reflectance (%): Out: 13-percent; In: 14-percent; Solar: 41-percent.
 - 3. Winter U-value (Imperial): 0.29 (Air).
 - 4. Shading Coefficient (SC): 0.32.
 - 5. Solar Heat Gain Coefficient (SHGC): 0.28.
 - 6. Light to Solar Gain (LSG): 2.18.
 - 7. DW Index: 0.47.

2.07 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 - 1. Neoprene complying with ASTM C864.
 - 2. EPDM complying with ASTM C864.
 - 3. Silicone complying with ASTM C1115.
 - 4. Thermoplastic polyolefin rubber complying with ASTM C1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with <u>ASTM C 509</u>, Type II, black; of profile and hardness required to maintain watertight seal.
 - 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with <u>ASTM C 542</u>, black.

2.08 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 4. Colors of Exposed Glazing Sealants: Clear.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 795.
 - b. GE Advanced Materials Silicones; SilPruf SCS2000.
 - c. Sika Corporation, Construction Products Division; SikaSil-C995.
 - d. Tremco Incorporated; Spectrem 2.
 - 2. Applications: All Glass interior walls.

2.09 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
2.10 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.11 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

2.12 SCHEDULE - GLAZING TYPES

- A. Glazing Types, as scheduled on the Drawings as Type 'GL-XX'.
- B. Abbreviations:
 - 1. AN Annealed.
 - 2. HS Heat Strengthened.
 - 3. FT Fully Tempered.
 - 4. LAM Laminated.
 - 5. STC Sound Transmission Coefficient.
 - 6. PVB Polyvinyl Butyral.

C. <u>GLAZING TYPE GL-1</u>: FLOAT GLASS:

- 1. Glass Type: 1/4-inch clear, AN Float Glass.
- 2. Applications:
 - a. Interior glazing unless otherwise indicated.

D. <u>GLAZING TYPE GL-2</u>: SAFETY GLAZING:

- 1. Glass Type: 1/4-inch clear, FT Safety Glass.
- 2. Applications:
 - a. Glazed lites in non-rated and 20-minute interior doors.
 - b. Glazed sidelight panels located next to doors
 - c. Glazed lites in partitions, except in fire-rated walls and partitions.
 - d. Other locations required by applicable federal, state, and local codes and regulations.
 - e. Other locations indicated on drawings.

E. <u>GLAZING TYPE GL-3</u>: SECURITY GLAZING:

- 1. Thickness:9/16-inch.
- 2. Glass Type: Clear, LAM.

- Makeup: Two (2) layers of 1/8-inch clear, AN float glass with a 0.060-inch PVB interlayer between glass.
- 1) Interlayer: Clear. Applications:
- a. At locations indicated on drawings.
- F. <u>GLAZING TYPE GL-5</u>: X-RAY PROTECTION GLAZING:
 - 1. Glass Type: Transparent lead-bearing glass for X-ray protection.
 - 2. Thickness: 17/32 inch (13.5 mm), nominal.
 - 3. Description: Lead glass laminated to clear float glass to comply with applicable building codes for safety glass.
 - 4. Makeup:

3.

- a. Outer Lite: 5/16-inch thick leaded X-Ray glass (2.1mm lead equivalency).
- b. Interlayer: 1/16-inch (1.5 mm) thick PVB.
- c. Inner Lite: 5/32-inch (4 mm) thick clear float glass.
- 5. Applications: Vision panels located in lead-lined partitions where indicated on drawings.

G. <u>GLAZING TYPE GL-11</u>: LOW-E COATED INSULATING GLAZING, ANNEALED GLASS:

- 1. Overall Unit Thickness: 1-inch (25 mm).
- 2. Makeup:
 - a. Outdoor Lite: 1/4-inch clear , AN, with Low-E coating on Surface 2.
 - 1) Low-E Coating: AGC Energy Select 28, triple silver coated.
 - b. Interspace: 1/2-inch clear air space with clear anodized spacer.
 - c. Indoor Lite: 1/4-inch clear, AN.
- 3. Applications: Exterior window glass, except where required to be safety glass by Code.
- H. <u>GLAZING TYPE GL-12</u>: LOW-E COATED INSULATING GLAZING, SAFETY GLASS:
 - 1. Overall Unit Thickness: 1-inch (25 mm).
 - 2. Makeup:
 - a. Outdoor Lite: 1/4-inch clear, FT glass with Low-E coating on Surface 2.
 - 1) Low-E Coating: AGC Energy Select 28, triple silver coated.
 - b. Interspace: 1/2-inch clear air space with clear anodized spacer.
 - c. Indoor Lite: 1/4-inch clear, FT glass..
 - 3. Provide safety glazing labeling.
 - 4. Applications:
 - a. Glazed lites in exterior doors.
 - b. Glazed sidelights and panels next to doors.
 - c. Other locations required by applicable federal, state, and local codes and regulations.
 - d. Other locations indicated on drawings.

I. <u>GLAZING TYPE GL-14</u>: LOW-E COATED INSULATING GLAZING, SECURITY GLASS:

- 1. Overall Unit Thickness: 1-5/16 inch.
- 2. Makeup:
 - a. Outdoor Lite (Tempered): 1/4-inch clear, FT glass with Low-E coating on Surface 2.
 1) Low-E Coating: AGC Energy Select 28, triple silver coated.
 - b. Interspace: 1/2-inch clear air space with clear anodized spacer.
 - c. Indoor Lite (Laminated): 9/16-inch clear, LAM glass (2-layers of 1/8-inch clear glass laminated together with a 0.060-inch PVB interlayer).
 - 1) Interlayer: Clear.
- 3. Provide safety glazing labeling.
- 4. Applications:
 - a. Glazed lites in exterior doors.

- b. Glazed sidelights and panels next to doors.
- c. Other locations required by applicable federal, state, and local codes and regulations.
- d. Other locations indicated on drawings.

PZART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 - 1. Verify prepared openings for glazing are correctly sized and within tolerance. Verify that the minimum required face and edge clearances are being followed.
 - 2. Verify that a functioning weep system is present.
 - 3. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Immediately before glazing, clean glazing channels and other framing members receiving glass. Remove coatings not firmly bonded to substrates.
- B. Demolition / Removal: Remove and replace glass that is broken, chipped, cracked or damaged in any way.

3.03 INSTALLATION

- A. Install products using the recommendations of manufacturers of glass, sealants, gaskets and other glazing materials including those in the GANA Glazing Manual except where more stringent requirements are indicated.
- B. Prevent glass from contact with contaminating substances that result from construction operations such as weld splatter, fire-safing or plastering.

3.04 CLEANING

A. Clean excess sealant or compound from glass and framing members immediately after application using solvents or cleaners recommended by manufacturers.

3.05 PROTECTION

- A. Protect glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish Date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Requirements for gypsum board assemblies.

1.03 RELATED SECTIONS:

- A. Section 06 10 00 Rough Carpentry.
- B. Section 07 21 00 Thermal Insulation.
- C. Section 07 92 00 Joint Sealants.
- D. Section 13 49 13 Integrated X-Ray Shielding Assemblies

1.04 ACTION SUBMITTALS

- A. Product Data: Provide data on gypsum board, accessories, and joint finishing system.
- B. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

1.06 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.07 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacture: USG Corporation.
 - 1. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - a. CertainTeed Corp.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.
 - d. Temple-Inland.

2.02 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies (as applicable): For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies (as applicable): For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.03 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.04 INTERIOR GYPSUM BOARD

- A. <u>TYPE 'X' INTERIOR GYPSUM BOARD</u>:
 - 1. Gypsum Board: ASTM C1396/C1396M, Type X.
 - 2. Product: USG; "Sheetrock® Brand EcoSmart Panels Firecode® X".
 - a. Composition: Noncombustible gypsum core encased in 100% recycled face and back papers.
 - b. Thickness: 5/8 inch.
 - c. Long Edges: Tapered.
 - 3. Physical Properties:
 - a. UL Type Designation: "ULIX".
 - b. ASTM E136: Non-combustibility: Meets or exceeds criteria.
 - c. ASTM E84: Surface-Burning Characteristics:
 - 1) Flame Spread: 5.
 - 2) Smoke Developed: 5.
 - d. Classified as a Class 'A' Interior Finish Material per Section 803.1 of the International Building Code.
 - e. ASTM C473:
 - 1) Core Hardness: Not less than 11.
 - 2) Flexural Strength (lbft).
 - (a) Parallel: Not less than 46.
 - (b) Perpendicular: Not less than 147.
 - 4. Uses:
 - a. Above 10'-0" a.f.f. where abuse-resistant gypsum board occurs on lower portion of wall.
 - b. Fire-rated wall construction.
 - c. Non-fire-rated wall construction.

B. INTERIOR GYPSUM CEILING BOARD:

- 1. Gypsum Board: ASTM C1396/C1396M, gypsum ceiling board.
- 2. Product: USG; "Sheetrock® Brand Gypsum Panels.
 - a. Composition: Fire-resistant gypsum core encased in 100% recycled face and back papers.
 - b. Thickness: 1/2-inch.
 - c. Long Edges: Tapered.
- 3. Physical Properties:
 - a. ASTM E84 Surface-Burning Characteristics:
 - 1) Flame Spread: 15.
 - 2) Smoke Developed: 0.
 - b. Classified as a Class 'A' Interior Finish Material per Section 803.1 of the International Building Code.
 - c. ASTM C473:
 - 1) Core Hardness: Not less than 11.

- 2) Flexural Strength (lbft).
 - (a) Parallel: Not less than 77.
 - (b) Perpendicular: Not less than 228.
- 4. Uses:
 - a. Non-fire-rated single-layer ceiling and soffit construction.

C. MOISTURE AND MOLD RESISTANT INTERIOR GYPSUM BOARD:

- 1. Gypsum Board: ASTM C1396/C1396M, Type X, water-resistant gypsum board.
- Product: USG; Sheetrock® Brand EcoSmart Panels, Mold Tough® Firecode® X Panels".
 a. Composition: Noncombustible, moisture- and mold-resistant gypsum core encased in moisture- and mold-resistant, 100% recycled green face and brown back papers.
 - b. Thickness: 5/8 inch.
 - c. Long Edges: Tapered.
- 3. Physical Properties:
- 4. UL Classification: Type "ULIX".
- 5. ASTM E136: Non-combustibility: Meets or exceeds criteria.
- 6. ASTM E84:Surface-Burning Characteristics:
 - a. Flame Spread: 5.
 - b. Smoke Developed: 5.
- 7. Classified as a Class 'A' Interior Finish Material per Section 803.1 of the International Building Code.
- 8. ASTM C473:
 - a. Core Hardness: Not less than 11.
 - b. Flexural Strength (lbft).
 - 1) Parallel: Not less than 46.
 - 2) Perpendicular: Not less than 147.
 - 3) The average water absorption for panels is not greater than 5% by weight after two-hour immersion.
 - c. ASTM D3273: Mold Resistance: A score of 10 as rated.
- 9. Uses:
 - a. As a substrate for tiling per Section 09 30 00 Tiling.
 - b. Fire-rated partitions.
 - c. Non-fire-rated partitions.
- D. ABUSE AND MOLD RESISTANT INTERIOR GYPSUM BOARD:
 - 1. Abuse Resistant Gypsum Board: ASTM C1629/C1629M, Type X, water-resistant gypsum board.
 - 2. Product: USG; "Sheetrock® Brand Mold Tough® AR Firecode® X Panels".
 - a. Composition: Noncombustible, moisture-resistant gypsum core encased in moistureand mold-resistant, 100% recycled green face and brown back papers.
 - b. Thickness: 5/8 inch.
 - c. Long Edges: Tapered.
 - 3. For abuse-resistant construction over steel framing, minimum 20-gauge drywall steel studs are required.
 - 4. Physical Properties:
 - a. UL Classification: Type "AR".
 - b. ASTM E136: Non-combustibility: Meets or exceeds criteria.
 - c. ASTM E84:Surface-Burning Characteristics:
 - 1) Flame Spread: 15.
 - 2) Smoke Developed: 5.
 - d. Classified as a Class 'A' Interior Finish Material per Section 803.1 of the International Building Code.
 - e. ASTM C1629/C1629M:
 - 1) Abrasion Resistance; Level 2.

- 2) Indentation Resistance; Level 1.
- 3) Soft Body Impact Resistance; Level 2.
- 4) Hard Body Impact Resistance; Level 1.
- f. ASTM C473: The average water absorption for panels is not greater than 5% by weight after two-hour immersion
- g. ASTM D3273: Mold Resistance: A score of 10 as rated.
- 5. Uses:
 - a. As a substrate for tiling per Section 09 30 00 Tiling.
 - b. Fire-rated partitions.
 - c. Non-fire-rated partitions.
- E. INTERIOR GYPSUM LINER PANELS: ASTM C1396/C1396M,
 - 1. Gypsum Liner Panel: ASTM C1396/C1396M, Type X, with moisture resistantance.
 - 2. Product: USG; Sheetrock® Brand Glass-Mat Liner Panels Mold Tough®.
 - a. Composition:
 - b. Thickness: 1 inch.
 - c. Long Edges: Double Beveled.
 - 3. Physical Properties:
 - a. UL Classification: Type "SLX".
 - b. ASTM D3273 Mold Resistance: A score of 10 as rated according to ASTM D3273.
 - c. ASTM E136: Non-combustibility: Meets or exceeds criteria.
 - d. ASTM E84 Surface-Burning Characteristics:
 - 1) Flame Spread: 20.
 - 2) Smoke Developed: 0.
 - e. Classified as a Class 'A' Interior Finish Material per Section 803.1 of the International Building Code.
 - f. ASTM C473:
 - 1) Core Hardness: Not less than 11.
 - 2) Flexural Strength (lbft).
 - (a) Parallel: Not less than 77.
 - (b) Perpendicular: Not less than 228.
 - 3) ASTM D3273: Mold Resistance: A score of 10 as rated.
 - 4. Uses:
 - a. Shaft wall liner panel.
 - 1) Fire Rating as indicated on drawings.

F. INTERIOR GLASS-MAT BACKERBOARD:

- 1. Glass-Mat Backerboard: ASTM C1178/C1178M.
- 2. Product: USG; "Durock™ Brand Glass-Mat Tile Backerboard"
- 3. Thickness: 5/8 inch.
- 4. Physical Properties:
 - a. Mold Resistance: ASTM D3273: Score of 10.
 - b. ASTM E84 Surface-Burning Characteristics:
 - 1) Flame Spread: 15.
 - 2) Smoke Developed: 5.
 - c. Permeability: ASTM E96/E96M: <1 perm.
- 5. Used behind porcelain and ceramic tile where indicated.
- 6. Fastener Requirements:
 - a. Screws for Fastening Backerboard to Metal Stud Framing: DUROCK Tile Backer Screws, 1-5/8 inches long.
- G. <u>LEAD-BACKED GYPSUM BOARD:</u>
 - 1. Refer to Section 13 49 13 Integrated X-Ray Shielding Assemblies for requirements.

2.05 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 - 1. Material: Galvanized or rolled zinc.
 - 2. Shapes:
 - a. Corner Bead: USG Sheetrock® Brand Dur-A-Bead® Corner Bead.
 - 1) Optional: USG Sheetrock® Brand Paper-Faced Metal Corner Bead Outside Corner, Tape-On (B1XW-EL Series).
 - b. Bullnose Corner Bead: USG Sheetrock® Brand Paper-Faced Metal Corner Bead 3/4" Bullnose Outside Corner, Tape-On (SLOC Series).
 - c. J-Trims: USG Sheetrock® Brand Paper-Faced Metal Trim, J-Shaped, Tape-On (B9 Series).
 - 1) Exposed long flange receives joint compound.
 - 2) Exposed short flange does not receive joint compound.
 - d. L-Trims: USG Sheetrock® Brand Paper-Faced Metal Trim, L-Shaped, Tape-On (B4 Series).
 - 1) Exposed long flange receives joint compound.
 - e. Reveal Trims: USG Sheetrock® Brand Paper-Faced Metal Trim Reveal, Tape-On (Reveal NB Series).

2.06 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.07 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Products: Subject to compliance with requirements, Refer to Section 07 92 00 Joint Sealants:
 - 2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Thermal Insulation: Refer to Section 07 21 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION - GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4-to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- F. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- G. STC-Rated Assemblies (if applicable): Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.03 INSTALLATION - GYPSUM BOARD

- A. Single-Layer Applications:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to wood stud supports with wood screws.
- B. Multi-layer Applications:
 - 1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 - 2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.04 INSTALLATION - TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C840, as shown on the drawings or coordinated with the Architect prior to the start of work. Control joints shall be installed in face layer of the gypsum board at the following locations:
 - 1. Ceilings: Install control joints in ceilings at 50-foot intervals in either direction to limit areas to 2,500 SF. Control joints shall also be installed where ceiling framing changes direction.
 - 2. Walls: In long partition runs without full height breaks, control joints should be installed at 30'-0" intervals, from floor to ceiling.
 - 3. Doorways and other wall openings: Full height door frames or other full height breaks in the wall surface may be considered as control joints. Less than ceiling height frames should have control joints extending to the ceiling from both corners. Borrowed lite frames should have control joints extending to the floor and ceiling from both corners.
 - 4. Align ceiling and soffit gypsum joints with wall gypsum joints where possible.
- C. Interior Trim: Install with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions. All exposed edges of gypsum shall have trim. Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use where indicated.
 - 3. L-Bead: Use where indicated.
 - 4. U-Bead: Use where indicated.

3.05 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. LEVEL 1: Plenum areas above ceiling, and other areas where gypsum board may be concealed.
 - a. Finish requirements:
 - 1) All joints and angles shall have tape embedded in joint compound.
 - 2) Tape and fastener heads need not be covered with joint compound.
 - 3) Tool marks and ridges are acceptable.
 - 2. LEVEL 2: Panels that are substrate for tile.
 - a. Finish requirements:
 - 1) All joints and angles shall have tape embedded in joint compound.
 - 2) Joints shall be wiped with a joint knife, leaving a thin coating of joint compound over all joints and angles.
 - 3) Fastener heads and accessories shall be covered with one coat of joint compound.
 - 4) Tool marks and ridges are acceptable.
 - 3. LEVEL 3: Not Used.
 - 4. LEVEL 4:
 - a. At exposed panel surfaces where paint finishes are scheduled. Refer to the Interior Finish Legend for paint sheen callouts.
 - b. Finish requirements:
 - 1) All joints and angles shall have tape embedded in joint compound.

- 2) Joints shall wiped with a joint knife, leaving a thin coating of joint compound over all joints and angles. In addition, two separate coats of joint compound shall be applied over all flat joints, and one separate coat applied over all angles.
- 3) Fastener heads and accessories shall be covered with three separate coats of joint compound.
- 4) Surface shall be smooth and free of tool marks and ridges.
- 5) The prepared surface shall be covered with drywall primer prior to the application of the final topcoats.

3.06 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Non-load-bearing steel framing systems for interior gypsum board assemblies.
- B. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
 - 2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.
- B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D. Provide sealed engineering calculations and designs as may be required for special framing conditions based on deflection limitations of L/240, 5 lbs/sq. ft. live load and dead load per location for painted finishes. Tile finishes shall have L/640 deflection limitations.

PART 2 PRODUCTS

2.01 DESCRIPTION

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.02 FRAMING SYSTEMS

- A. Fire Rated Assemblies: Comply with applicable code and as follows:
 - 1. Fire Rated Partitions: Listed assembly by UL, as shown on the drawings.
 - 2. Top of Fire Rated Partitions: Listed assembly by UL, as shown on the drawings.
 - 3. Fire Rated Ceiling and Soffits: Listed assembly by UL, as shown on the drawings.
 - 4. Fire Rated Structural Column Framing: Listed assembly by UL, as shown on the drawings.
 - 5. Fire Rated Structural Beam Framing: Listed assembly by UL, as shown on the drawings.
 - 6. Fire Rated Shaft Wall Requirements: Listed assembly by UL, as shown on the drawings.

2.03 MANUFACTURER

- A. Specified Manufacture: Clark Dietrich Building Systems.
 - 1. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be accepted. Additional manufacturers will be considered in accordance with the "or equal" provision specified in Section 01 60 00 Product Requirements.
 - a. CEMCO
 - b. MarinoWARE.
 - c. Simpson Strong Tie.
 - d. The Steel Network, Inc.

2. Substitutions: Submit a request for substitution for any manufacturer not named, as specified in Section 01 25 00 - Substitution Procedures.

2.04 MATERIALS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, G60 (Z180), hot-dip galvanized, unless otherwise indicated.
- B. Studs and Runners: ASTM C645. Use either steel studs and runners or Pro steel studs and runners.
 - 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm) 20-gauge for studs and runners at impact resistant gypsum board partitions, partitions indicated to receive ceramic tile, fire and smoke rated partitions, door jambs and at other indicated locations.
 - b. Depth: 3-5/8 inches, 6 inches, 2-1/2 inches, or 1-5/8 inches as indicated on drawings.
 - 2. Dimpled Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.025 inch (0.64 mm) 25-gauge
 - b. Depth: 3-5/8 inches, 6 inches, 2-1/2 inches, or 1-5/8 inches as indicated on drawings.
- C. Slip-Type Head Joints: Where indicated, provide, allowing for 1" of movement, or other as indicated:
 - 1. Single Long-Leg Slotted Runner System: ASTM C645 top runner with 2-1/2-inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm) 20-gauge.
- E. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) 16-gauge minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: 1-1/2 inches (38 mm).
- F. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch (1.72-mm) 14-gauge thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C645.
 - 1. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm) 25-gauge
 - 2. Depth: 7/8 inch (22.2 mm).
- H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.018 inch (0.45 mm) 25 gauge, and depth required to fit insulation thickness indicated.

2.05 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488/E488M by an independent testing agency.
 - a. Type: Post-installed, expansion anchor.
 - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed

by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: 1-1/2 inches (38 mm).
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
 - 2. Steel Studs and Runners: ASTM C645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings or determined by span and loading requirements.
 - b. Depth: As indicated on Drawings, 3-5/8 inches (92 mm) typical and others as needed by spans and loadings.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.
 - a. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; Drywall Grid System.
 - c. USG Corporation; Drywall Suspension System.

2.06 FABRICATION

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.
- C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

2.07 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.03 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.

- 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.04 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
 - 1. Space studs as follows:
 - a. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
 - b. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
 - c. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two 20 ga. studs at each jamb unless otherwise indicated.
 - Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- D. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- E. Z-Furring Members:
 - 1. Erect insulation, specified in Section 07 21 00 "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches (610 mm) o.c.
 - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
 - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.05 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards, minimum of 5 pounds per square foot uniform live load plus dead loads with L/360 deflection limit.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 09 30 50

METAL EDGE PROTECTION AND TRANSITION PROFILES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Edge-protection and transition profiles for floors and walls.

1.03 RELATED SECTIONS

- A. Section 03 30 00 Cast-in-Place Concrete
- B. Section 09 30 00 Tiling
- C. Section 09 65 00 Resilient Flooring
- D. Section 09 68 13 Tile Carpeting

1.04 REFERENCE STANDARDS

- A. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.
- B. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five-years experience.
- B. Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 COORDINATION

A. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

1.10 WARRANTY

A. Floor Profiles - Limited Warranty: The manufacturer shall warrant the product against material defects, or defects in manufacturing, for five (5) years from Date of Substantial Completion.

- B. Wall and Countertop Profiles Limited Warranty: The manufacturer shall warrant the product against material defects, or defects in manufacturing, for five (5) years from Date of Substantial Completion.
- C. Stair-Nosing Profiles Limited Warranty: The manufacturer shall warrant the product against material defects, or defects in manufacturing, for five (5) years from Date of Substantial Completion.
- D. Movement Joints and Cove-Shaped Profiles Limited Warranty: The manufacturer shall warrant the product against material defects, or defects in manufacturing, for five (5) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Schluter Systems.
 - 1. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.

2.02 APPLICATIONS

- A. Applications for Metal Edge Protection and Transition Profiles:
 - 1. Open edges of wall tile.
 - 2. Open edges of floor tile.
 - 3. Wall corners, outside and/or inside.
 - 4. Transition between floor finishes of different heights.

2.03 EDGE-PROTECTION AND TRANSITION PROFILES FOR FLOORS

- A. Edge Protection and Transition Profiles for Floors, as scheduled on the Drawings as Finish Type 'TRS- #'.
 - 1. Product/s: Refer to the "Interior Finish Legend" (Sheet A4.2) for pertinent information on this Finish Type.
- B. Type TRS-1: Schluter-RENO-U
 - 1. Description: profile with sloped exposed surface, 5/32 inch (4 mm) tall leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
 - 2. Material and Finish:
 - a. AE Satin Anodized Aluminum.
 - 1) Height as required to coordinate with tile selection and setting system selected.

2.04 FINISHING AND EDGE-PROTECTION PROFILES FOR WALLS

- A. Edge Protection and Transition Profiles for Walls, as scheduled on the Drawings as Finish Type 'MT- #'.
 - 1. Product/s: Refer to the "Interior Finish Legend" (Sheet A4.2) for pertinent information on this Finish Type.
- B. Type MT-2: Schluter-JOLLY
 - 1. Description: L-shaped profile with 1/8 inch (3.2 mm) wide top section vertical wall section that together form the visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
 - 2. Anchoring Leg:
 - a. Provide with straight anchoring leg.
 - b. Provide with special radius anchoring leg for radius applications.
 - 3. Material and Finish:
 - a. AT Satin Nickel Anodized Aluminum.
 - 1) Height as required to coordinate with tile selection and setting system selected.

2.05 MOVEMENT JOINTS AND COVE-SHAPED PROFILES

A. Movement Joints and Coved -Shaped Profiles, as scheduled on the Drawings as Finish Type MT- #.

- 1. Product/s: Refer to the "Interior Finish Legend" (Sheet A4.2) for pertinent information on this Finish Type.
- B. Type MT-1: Schluter-DILEX-AHK
 - 1. Description: anodized aluminum profile with integrated trapezoid-perforated anchoring legs, connected at a 90-degree angle by a cove shaped section with 3/8 inch (10 mm) radius that forms the visible surface.
 - 2. Corners:
 - a. Provide with matching inside corners.
 - b. Provide with matching outside corners.
 - c. Provide with matching end caps.
 - d. Provide with matching connectors.
 - 3. Material and Finish:
 - a. AE Satin Anodized Aluminum.
 - 1) Height as required to coordinate with tile selection and setting system selected.

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 the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.04 PROTECTION

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

END OF SECTION

SECTION 09 51 00

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Suspended acoustical ceilings including the following:
 - 1. Acoustical panels (suspended).
 - 2. Exposed tee metal grid ceiling system and perimeter trim.
- B. Acoustical Suspended Panel Ceilings.

1.03 DESIGN / PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to IBC Section 1613 or ASCE/SEI 7.
 - 1. Occupancy (Risk) Category: II.
 - 2. Site Classification (1613.3.2): C.
 - 3. Seismic Design Category: B.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials, 25 or less.
 - 2. Smoke-Developed Index: 50 or less.

1.04 SUBMITTALS

- A. Submit under the provisions of Section 01 33 00 Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Dimensions, load carrying capacity, and performance standards compliance.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation and maintenance instructions.
- C. Shop Drawings: Reflected ceiling plan indicating ceiling layouts, dimensions and perimeter conditions, and ceiling schedule including panel and grid types to match codes used on the Drawings. Indicate grid layouts and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system. Indicate method of suspension where interference exists.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, actual size of acoustical units, and two samples minimum size 12 inches (300 mm) long of main tees and cross tees square, representing actual product, color, finish and patterns.
- F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- G. Verification Samples: For each finish product specified, two samples, actual size of acoustical units, and two samples minimum size 12 inches (300 mm) long of main tees and cross tees square, representing actual product, color, finish and patterns.
- H. Closeout Submittals
 - 1. Maintenance Data: For finishes to include in maintenance manuals.

1.05 QUALITY ASSURANCE

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

- B. Manufacturer member in good standing of CISCA (Ceiling and Interior Systems Construction Association)
- C. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience.
- D. Provide seismic design of suspended ceiling under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.06 DELIVERY, STORAGE AND HANDLING

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

1.07 SEQUENCING

- A. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities and wet work have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustic units after interior wet work is dry.
- C. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.09 EXTRA MATERIALS

- A. Deliver extra acoustical units for Owner's use in maintenance. Label and store where directed by the Owner including codes used on the Drawings. Do not deliver to the Project site until the Owner is prepared to receive and store maintenance materials.
 - 1. Ceiling Panels: For each type specified, provide full-size panels in unopened boxes equal to no less than 5 percent of quantity installed.

1.10 WARRANTY

- A. Acoustical Ceiling Systems:
 - 1. The manufacturer shall warrant the ceiling panels and suspension systems to be free from defects in materials or factory workmanship for thirty (30) years from Date of Substantial Completion, when installed together and used under normal conditions.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Acoustical Ceiling Systems:
 - 1. Specified Manufacturer: Armstrong World Industries, Inc.
 - a. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.

2.02 ACOUSTICAL CEILINGS

- A. Acoustical Ceiling Panels, scheduled on the Drawings as Finish Type ACT- #.
 - 1. Product/s: Refer to the "Interior Finish Legend" (Sheet A4.2) for pertinent information on this Finish Type.
- B. Acoustical Ceiling Panel Types:

- C. Physical Properties, General:
 - 1. Material: Wet-formed mineral fiber with factory-applied latex paint.
 - 2. Performance:
 - a. Surface Burning Characteristics (ASTM E84): Flame Spread Index: 25 or less; Smoke Developed Index: 50 or less.
 - b. Fire Class (ASTM E1264): Class A.
- D. Acoustical Ceiling Panel, Type ACT-1:
 - 1. Manufacturer: As scheduled on drawings.
 - 2. Product: As scheduled on drawings.
 - a. Minimum Requirements: Comply with ASTM E1264, Type III, Form 1, Pattern C E.
 - b. Size: 24-inch by 24-inch by 7/8-inch.
 - c. Edges: Square.
 - d. Recycled Content: 73%.
 - e. Sag / Humidity Resistant.
 - f. Mold and Mildew Resistant.
 - g. Color: White.
 - h. Suspension System: Prelude XL 15/16" Exposed Tee.
 - 3. Acoustic Performance: CAC = 35, LR = 86%, NRC = 0.75, AC = 170.
- E. Suspension System:
 - 1. Product: Armstrong; Prelude XL 15/16" Exposed Tee, Direct-Hung, Double-Web Suspension System.
 - 2. Description: Main and cross runners roll formed from and capped with cold-rolled steel sheet, pre-painted white, electrolytically zinc coated, or hot-dip galvanized according to ASTM A653/A653M, G30 (Z90) coating designation.
 - a. Structural Classification: Intermediate-duty system.
 - b. Access: Upward
 - c. Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C635/C635M.
 - d. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1) Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - 2) Size: Select wire diameter so its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire but provide not less than 0.106-inch (2.69-mm) diameter wire.
- F. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners, white.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
 - 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.03 OTHER SUSPENDED CEILING SYSTEMS

- A. Specialty Ceiling Systems: Refer to Section 09 51 16.
 - 1. Acoustical Ceiling Baffles.
 - 2. Acoustical Clouds.
 - 3. Linear Acoustical Panels.
 - 4. Acoustical Metal Ceilings.
- B. Linear Metal Ceilings: Refer to Section 09 54 23.

C. Suspended Wood Ceilings: Refer to Section 09 54 26 - Suspended Wood Ceilings

2.04 ACOUSTICAL SEALANT

- A. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Acoustical Sealant for Concealed Joints:
 - a. Henkel Corporation; OSI Sealants Pro-Series SC-175 Rubber Base Sound Sealant.
 - b. Pecora Corporation; AIS-919.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Concealed Joints: Nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant.

PART 1 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify layout of hangers will not interfere with other work.
- C. Verify acoustical unit layout conditions, which will adversely affect installation.
- D. If layout or substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Verify wet work such as plastering and concrete is complete and dry. Verify building is enclosed and under standard occupancy conditions prior to start of installation.
- F. Commencement of installation constitutes Installer's acceptance of substrate conditions.

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Suspend ceiling hangers from building's structural members and as follows:
 - a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - b. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - c. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - d. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - e. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the

type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

- f. Fasten hangers to postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
- g. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
- h. Attach hangers to structural members.
- i. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
- j. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- 2. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- 3. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
 - a. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
 - b. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- 4. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- 5. Arrange directionally patterned acoustical ceiling panels and/or tiles as indicated on reflected ceiling plans
- B. Install acoustical ceiling tiles per manufacturer's requirements.

3.04 ERECTION 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.

3.05 PROTECTION AND CLEANING

- A. Protect installed products until completion of project.
- B. Clean adjacent surfaces and remove unused materials and debris from site.
- C. Clean exposed surfaces in accordance with manufacturer's written instructions.
- D. Remove and reinstall improperly installed material.
- E. Remove damaged components, replace with undamaged components.
- F. Touch-up, repair or replace damaged units until satisfactory results are obtained.
- G. Clean with non-solvent based non-abrasive commercial cleaning solution.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Resilient sheet flooring.
- B. Luxury Vinyl Tile.
- C. Installation accessories.

1.03 RELATED SECTIONS

- A. Section 01 45 00 Concrete In-Situ Relative Humidity and pH Testing
- B. Section 09 65 13 Resilient Base and Accessories
- C. Section 03 30 00 Cast-in-Place Concrete

1.04 REFERENCE STANDARDS

- A. AATCC Test Method 134 Electrostatic Propensity of Carpets; 2016.
- B. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine; 2011.
- C. ASTM D2240 Standard Test Method for Rubber Property--Durometer Hardness; 2015.
- D. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials; 2017a.
- E. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2015.
- F. ASTM F2055 Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gage Method; 2017.
- G. ASTM F925 Standard Test Method for Resistance to Chemicals of Resilient Flooring; 2013.
- H. ASTM F970 Standard Test Method for Static Load Limit; 2015.
- I. ASTM F1303 Standard Specification for Sheet Vinyl Floor Covering with Backing; 2004 (Reapproved 2014).
- J. ASTM F1344 Standard Specification for Rubber Floor Tile; 2015.
- K. ASTM F1700 Standard Specification for Solid Vinyl Floor Tile; 2013a.
- L. ASTM F1913 Standard Specification for Vinyl Sheet Floor Covering Without Backing; 2004 (Reapproved 2014).
- M. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.05 SUBMITTALS

- A. See Section 01 33 00 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. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Verification Samples: Submit two samples, in size illustrating color and pattern for each resilient flooring product specified.
- E. Concrete Testing Standard: Submit a copy of ASTM F710.

- F. Concrete Sub-floor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- G. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.06 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.

1.07 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.

1.08 FIELD CONDITIONS

A. Maintain temperature and humidity at service levels or the ambient temperature must remain steady (± 10°F) and be between 59°F and 80°F for at least 48-hours prior, during and 72-hours after installation. .) The ambient relative humidity is recommended to be 50% RH ± 10%; however, dew point must be avoided.

1.09 EXTRA MATERIALS

- A. Deliver extra resilient flooring material for Owner's use in maintenance. Label and store where directed by the Owner including codes used on the Drawings. Do not deliver to the Project site until the Owner is prepared to receive and store maintenance materials.
 - 1. Luxury Vinyl Tile: For each type specified, provide full-size tiles in unopened boxes equal to no less than 3 percent of each type and color installed.

1.10 WARRANTY

A. Refer to "Warranty" Articles for each material specified.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Specified Manufacturer: Refer to flooring types for manufacturer callouts.
 - 1. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.

2.02 RESILIENT SHEET FLOORING

- A. Resilient Sheet Flooring, as scheduled on the Drawings as Finish Type RSF-1, RSF-2, RSF-3, RSF-4, and RSF-5
 - 1. Product/s: Refer to the "Interior Finish Legend" (Sheet A4.5) for pertinent information on this Finish Type.
- B. Heterogeneous Vinyl Sheet Floor Covering:
 - 1. Reference Specification: ASTM F1303, Type I, Grade 1, Class C Backing.
 - 2. Material: A multi-layered construction consisting of a clear vinyl wear layer and a printed, reinforced fiberglass inner layer on a solid vinyl backing. Protected by a UV-cured, high-performance diamond-infused polyurethane finish, the wear surface has an overall embossed texture.
 - 3. Physical Properties:
 - a. Overall Thickness (nom.): 0.080-inches (2.0 mm)
 - b. Wear Layer Thickness (nom.): 0.022-inches (0.55 mm)
 - c. Width: 6'-7" (2.0 m).
 - 4. Performance:

**

- a. Fire Test Data:
 - ASTM E648: Critical Radiant Flux: 0.45 watts/sq. cm, minimum: Class 1.
 ASTM E662: Smoke Density: 450 or less.
- b. ASTM F970: Static Load Limit: 750 psi (52.73 kg/sq cm).
- c. ADA Standards for Accessible Design: Chapter 3, Section 302.1: Floor surfaces shall be stable, firm, and slip-resistant.
- 5. Installation:
 - a. Seams: heat weld or S-761 Seam Adhesive
 - b. Adhesives:
- 6. Warranty:
 - a. The manufacturer shall warrant the installation to be free of defects in material and workmanship for a period of five (5) years from Date of Substantial Completion.
 - b. The manufacturer shall warrant the product against material defects, or defects in manufacturing, for five (5) years from Date of Substantial Completion.
- C. Homogeneous Vinyl Sheet Floor Covering:
 - 1. Reference Specification: ASTM F1913, Standard Specification for Vinyl Sheet Floor Covering
 - 2. Material: A cultured diamond infused coated, nonbacked, nonlayered, homogeneous vinyl composition of polyvinyl chloride resin, plasticizers, stabilizers, fillers and pigments suitable for use on approved subfloors on all grade levels.
 - 3. Physical Properties:
 - a. Overall Thickness (nom.): 0.080-inches (80 mils) (2.0 mm)
 - b. Wear Layer Thickness (nom.): 0.080-inches (80 mils) (2.0 mm)
 - c. Factory Finish: Diamond 10 Technology coating
 - d. Width: 6'-7"
 - 4. Performance:
 - a. Fire Test Data:
 - ASTM E648: Critical Radiant Flux: 0.45 watts/sq. cm, minimum: Class 1.
 ASTM E662: Smoke Density: 450 or less.
 - b. ASTM F970: Static Load Limit: 750 psi (52.73 kg/sq cm). **
 - c. ADA Standards for Accessible Design: Chapter 3, Section 302.1: Floor surfaces shall be stable, firm, and slip-resistant.
 - 5. Installation:
 - a. Seams: heat weld or S-761 Seam Adhesive
 - b. Adhesives:
 - 6. Warranty
 - a. The manufacturer shall warrant the installation to be free of defects in material and workmanship for a period of five (5) years from Date of Substantial Completion.
 - b. The manufacturer shall warrant the product against material defects, or defects in manufacturing, for five (5) years from Date of Substantial Completion.

D. Physical Properties, General:

- 1. Material: Vulcanized rubber compound 913 with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium or mercury.
- 2. Performance: Products shall meet or exceed the following standards:
 - a. Surface Burning Characteristics: Flame Spread Rating: 15; Smoke Developed: 90.
 - b. Smoke Density: Per ASTM E662: 450 or less.
 - c. Flammability: Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648: Critical Radiant Flux: 0.45 watts/sq. cm, minimum: Class 1. **
 - d. Slip Resistance per ASTM D2047
 - e. Static Load: Per AATCC Test Method 134
 - f. Hardness: Per-ASTM D2240
 - g. Static Load Limit: Per ASTM F970: 750 psi (52.73 kg/sq cm). **
 - h. ADA Standards for Accessible Design: Chapter 3, Section 302.1: Floor surfaces shall be stable, firm, and slip-resistant.

- E. Adhesive:
 - 1. Field Areas: Per manufacturer.
- F. Warranty:
 - 1. Commercial Resilient Limited Warranty: The manufacturer shall warrant the product against material defects, or defects in manufacturing, for ten (10) years from Date of Substantial Completion.
 - 2. Installation Warranty: The installer shall warrant the product/s to be free of defects in material and workmanship for a period of one (1) year from Date of Substantial Completion.

2.03 INTEGRAL FLASH COVE BASE

- A. Integral Flash Cove Base: Provide integral flash cove wall base by extending sheet flooring 6-inches up the wall using adhesive, welding rod, and accessories recommended and approved by the flooring manufacturer.
- B. Integral Flash Cove Base, scheduled on the Drawings as Finish Type 'IB- #'.
- C. Type IB-1 thru IB-5:
 - 1. Basis of Design: Refer to the "Interior Finish Legend" (Sheet A4.5 of the Drawings) for the manufacturer's name, make or model number, color, size, and other pertinent information for the product to be used.
 - a. Height: 6-inches.

2.04 LUXURY VINYL TILE

- A. Luxury Vinyl Tile Flooring, as scheduled on the Drawings as Finish Type LVT- 1.
 - 1. Product/s: Refer to the "Interior Finish Legend" (Sheet A4.5), and this Article, for pertinent information on this Finish Type.
- B. Luxury Vinyl Tile Flooring System:
 - 1. Reference Specification: ASTM F1700, Class III, Type B Embossed Surface.
 - 2. Material: A tough, clear, unfilled polyurethane wear layer composed of polyvinyl chloride resins, plasticizers, stabilizers and processing aids on a filled vinyl backing.
 - 3. Physical Properties:
 - a. Overall Thickness (nom.): 0.125-inches (3.2 mm) (1/8-inch)
 - b. Wear Layer Thickness (nom.): 0.020-inches (0.5 mm)
 - c. Finish: Diamond 10 Technology coating
 - d. Surface Texture: Embossed.
 - e. Nominal Dimensions: As scheduled.
 - f. Installation Method: Direct glue-down.
 - g. Installation Pattern: As scheduled.
 - h. Backing Class: Commercial Grade
 - i. Commercial Traffic: Heavy Commercial.
 - j. Adhesive: Per manufacturer.
 - 4. Performance:
 - a. Fire Test Data:
 - 1) ASTM E648: Critical Radiant Flux: 0.45 watts/sq. cm, minimum: Class 1.
 - 2) ASTM E662: Smoke Density: 450 or less.
 - b. ASTM F970: Static Load Limit: 250 psi (17.6 kg/sq cm).
 - c. ADA Standards for Accessible Design: Chapter 3, Section 302.1: Floor surfaces shall be stable, firm, and slip-resistant.
 - 5. Installation:
 - a. Adhesives: Per manufacturer
 - 6. Warranty:
 - a. The manufacturer shall warrant the installation to be free of defects in material and workmanship for a period of twenty (20) years from Date of Substantial Completion.
 - b. The manufacturer shall warrant the product against material defects, or defects in manufacturing, for twenty (20) years from Date of Substantial Completion.

- C. Physical Properties, General:
 - 1. Material: Vulcanized rubber compound 926 with environmentally compatible color pigments that are free of toxic heavy metals like lead, cadmium or mercury.
 - 2. Composition: Homogeneous rubber compound with with a random scattered design.
 - 3. Performance:
 - a. Surface Burning (CAN/ULC-S102.2): Flame Spread: 70; Smoke Developed: 470.
 - b. Fire Performance:
 - 1) ASTM E648: Tested Class I.
 - 2) ASTM E662: Less than 450.
 - c. Flammibility:0.92 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - d. Smoke Density: ASTM E662: Passes, equal to or less than 450.
 - e. Static Load Resistance: 1,500 psi minimum, when tested as specified in ASTM F970.
 - f. Slip Resistance (ASTM D2047): Static coefficient of friction: Dry: 0.55; Wet: 0.55.
 - g. Bacteria Resistance (ASTM E2180 / ASTM G21): Passed.
 - h. Chemical Resistance (ASTM F925): Passes.
 - i. Hardness (ASTM D2240): Shore type "A", 82 achieved.
 - j. Load Limit: 850 lbs/sq. in.
 - k. Static Generation (AATCC Test Method 134): < 2000 Volts at 20% RH, achieved.

D. Warranty:

- 1. Manufacturer's Warranty: The manufacturer shall warrant the product against material defects, or defects in manufacturing, for fifteen (15) years from Date of Substantial Completion.
- 2. Installation Warranty: The installer shall warrant the product/s to be free of defects in material and workmanship for a period of one (1) year from Date of Substantial Completion.
- E. Type LVT- 1:
 - 1. Manufacturer: As scheduled.
 - 2. Product: As scheduled.
 - 3. Product Requirements:
 - a. Minimum Requirements: Comply with ASTM F1700, Class III, Type B.
 - b. Nominal Dimensions: As scheduled.
 - c. Installation Method: Direct glue-down.
 - d. Installation Pattern: As scheduled.
 - e. Backing Class: Commercial Grade
 - f. Commercial Traffic: Heavy Commercial.
 - g. Adhesive: Per manufacturer.
 - h. Performance:
 - 1) Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 (NFPA 253): Class I.
 - 2) ASTM E662 (NFPA 258) Smoke Density: 450 or less.
 - 3) ADA Standards for Accessible Design: Chapter 3, Section 302.1: Floor surfaces shall be stable, firm, and slip-resistant.
 - i. Warranty: Provide a twenty (20) year Commercial Resilient Limited Warranty from Date of Substantial Completion.

2.05 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. Resilient Moldings, Transition and Edge Strips: See Section 09 65 13 Resilient Base and Accessories.

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. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Test in accordance with Section 01 45 00 Concrete In-Situ Relative Humidity and pH Testing.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

3.03 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent materials.
- B. Starting installation constitutes acceptance of sub-floor conditions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints and butt seams tightly.
- E. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- F. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.
- G. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Seal seams by heat welding where indicated.
- C. Chemically bond seams using seam sealer where indicated.

3.05 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.06 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

Resilient wall base.

1.03 RELATED SECTIONS

Section 09 65 00 - Resilient Flooring

Section 09 68 13 - Tile Carpeting

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12-inches (300 mm) long, of each resilient product color, texture, and pattern required.
- D. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.05 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
- B. Mockups: Provide resilient products with mockups specified in other Sections.

1.06 DELIVERY, STORAGE AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.07 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.08 EXTRA MATERIALS

- A. Deliver extra resilient base units for Owner's use in maintenance. Label and store where directed by the Owner including codes used on the Drawings. Do not deliver to the Project site until the Owner is prepared to receive and store maintenance materials.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet, or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.09 WARRANTY

A. Warranty: Provide manufacturer's standard warranty against manufacturing defects in material or workmanship during the warranty period.

1. Warranty Period: One (1) year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Specified Manufacturer: Johnsonite.
 - 1. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.

2.02 MATERIALS

- A. Rubber Wall Base and Accessories: Meet or exceed the requirements of ASTM F1861, Type TS (Thermoset) rubber formulations, Group 1 (solid).
 - 1. Construction: 100% vulcanized homogenous rubber compound comprised of a premium blend and SBR rubber materials.

2.03 PERFORMANCE REQUIREMENTS

- A. Materials shall meet or exceed the following performance criteria:
 - 1. Flame Spread / Smoke Density (ASTM E84): Class B.
 - 2. Flammability / Critical Radiant Flux (ASTM E648): Class I.
 - 3. Smoke Density (ASTM E662): < 450: Passes.
 - 4. Flexibility (ASTM F137): Passes.
 - 5. Color Stability: Meets or exceeds ASTM F1861 requirements for color stability when tested to <u>ASTM F1515</u>.
 - 6. Chemical Resistant (ASTM D925): Passed.
 - 7. SCS FloorScore® Certified.
- B. Manufacturing facility shall be ISO 9001 and ISO 14001 Certified.

2.04 RESILIENT WALL BASE

- A. Resilient Base, scheduled on the Drawings as Finish Type RB-#.
 - 1. Product/s: Refer to the "Interior Finish Legend" (Sheet A4.2) for pertinent information on this Finish Type.
- B. General:
 - 1. Classification: ASTM F1861, Type TS rubber, vulcanized thermoset, Group 1.
 - 2. Material & Composition: 100% vulcanized homogenous rubber compound comprised of a premium blend and SBR rubber materials.
 - a. Phthalate, chlorine and halogen free.
 - b. 100% Recyclable.
 - c. Contains 2.3% rapidly renewable content.
- C. Type RB-1:
 - 1. Product: Johnsonite; "Baseworks Thermoset Rubber Wall Base".
 - 2. Classification: ASTM F1861, Type TS rubber, vulcanized thermoset, Group 1.
 - 3. Material & Composition: 100% vulcanized homogenous rubber compound comprised of a premium blend and SBR rubber materials.
 - 4. Product Requirements:
 - a. Thickness: 1/8 inch.
 - b. Height: 4 inches.
 - c. Profile: Toe.
 - d. Length: 8-foot lengths or 120-foot coils.
 - e. Outside Corners: Mitered.
 - f. Inside Corners: Mitered or coped.

2.05 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated. B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.03 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

3.04 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION

SECTION 09 91 13 EXTERIOR PAINTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Surface preparation and field painting of exposed exterior items and surfaces.

1.03 RELATED SECTIONS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

1.04 DEFINITIONS

- A. DFT as used in this Section refers to the Dry Film Thickness of the coating.
- B. DTM as used in this Section refers to paint that is applied Direct To Metal.
- C. VOC as used in this Section refers to Volatile Organic Compounds found in primers, paints, sealers and stains. The level of VOCs appears after each product listed in the Schedule in grams per liter (g/L).
- D. Paints are available in a wide range of sheens or glosses, as measured by a gloss meter from a 60 and/or 85 degree angle from vertical, as a percentage of the amount of light that is reflected. The following terms are used to describe the gloss of our products. The list below is provided for general guidance; refer to the technical data sheet for the actual gloss/sheen level for each product.
 - 1. Gloss level 1 Flat with a gloss range below 5 when measured at a 60-degree meter and 10 when measured at an 85-degree meter.
 - 2. Gloss level 2 Low Sheen with a gloss range of 5 to 10 when measured at a 60 degree meter and 10 to 35 when measured at an 85 degree meter.
 - 3. Gloss level 3 Eggshell with a gloss range between 10 and 15 when measured at a 60-degree meter and 10 to 35 when measured at an 85-degree meter.
 - 4. Gloss level 4 Satin with a gloss range between 25 to 35 when measured with a 60 degree meter.
 - 5. Gloss level 5 Semi-Gloss with a gloss range between 50 and 55 when measured at a 60 degree meter.
 - 6. Gloss level 6 Gloss with a gloss range more than 70 when measured at a 60 degree meter.

1.05 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. MPI (APSM) Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- D. SSPC-SP 1 Solvent Cleaning; 2015.
- E. SSPC-SP 2 Hand Tool Cleaning; 1982 (Ed. 2004).
- F. SSPC-SP 3 Power Tool Cleaning; 1982 (Ed. 2004).

1.06 SUBMITTALS

- A. Refer to Section 01 33 00 Submittal Procedures for additional requirements.
- B. Product Data: Manufacturer's data sheets on each paint and coating product should include:
 1. Product characteristics.
 - 2. Surface preparation instructions and recommendations.

- 3. Primer requirements and finish specification.
- 4. Storage and handling requirements and recommendations.
- 5. Application methods.
- 6. Clean-up Information.
- 7. VOCs.
- 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.
 - 2. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

1.07 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.08 EXTRA MATERIALS

- A. Deliver extra resilient base units for Owner's use in maintenance. Label and store where directed by the Owner including codes used on the Drawings. Do not deliver to the Project site until the Owner is prepared to receive and store maintenance materials.
 - 1. Paint: One (1) unopened gallon can of each color and sheen specified.
 - a. Label each container with color in addition to the manufacturer's label.
 - b. Include one copy of the Interior Finish Schedule with the paint material.
 - c. Include MSDS information for all materials delivered.

1.09 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.
- C. Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard products, colors and sheens available.
- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.
- E. Paint coordination:
 - 1. Provide finish coats which are compatible with the prime coats actually used.
 - 2. Review other Sections of these Specifications as required, verifying the primer coats to be used and assuring compatibility of the total coating system for the various substrate.
 - 3. Furnish information on the characteristics of the specific finish materials to assure that compatible primer coats are used.
 - 4. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required.
 - 5. Notify the Architect in writing of anticipated problems in using the specified coating system over prime-coatings supplied under other Sections.

1.10 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.

1.11 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. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

1.12 GUARANTEE

- A. The painting contractor shall furnish a guarantee to repair or replace any or all work which is found to be defective in workmanship or materials, together with any adjacent work disturbed by rectifying the defective work, for the time period indicated.
 - 1. Guarantee Period: Two (2) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: The Sherwin-Williams Paint Company; (P: (800) 474-3794 / Web: www.sherwin-williams.com / Local Sales Rep: Brook Nienstedt - (913) 381-8633 / E-mail: brook.b.nienstedt@sherwin.com)
 - 1. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - a. Benjamin Moore.
 - b. Behr Process Corporation.
 - c. Diamond Vogel Paints.
 - d. PPG Paints.
 - e. Valspar Corporation.
- B. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
 - 1. Consistency: 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. Compatibility: 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. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Unless noted otherwise, a typical paint system consists of:
 - 1. One (1) Coat of Primer/Filler.
 - 2. One (1) Intermediate Coat.
 - 3. One (1) Top Coat.
- C. For opaque finishes, tint each coat as follows:
 - 1. Primer Coat: Do NOT tint primer coat.
 - 2. Intermediate Coat: Tint intermediate coat as base color, applied with a FLAT sheen.
 - 3. Top Coat: Final finish coat shall be applied as base color with the specified sheen.
- D. Sheens: Provide the sheens specified.

2.03 PAINT FINISHES

- A. Paint Finishes, scheduled on the Drawings as Finish Type PT-XX.
 - 1. Refer to the "Interior Finish Legend" (Sheet A7.5) for the manufacturer's name, the product model, color, and other pertinent information on this Finish Type.
- B. Paint Finish Types PT-1, PT-1A, PT-1B, PT-2, PT-3, PT-4, PT-4A, and PT-5
 - 1. Product Type: Both latex and epoxy as scheduled.
- 2. Product Sheen: As scheduled.
- 3. Product Code / Color: As scheduled.

2.04 PERFORMANCE REQUIREMENTS

- A. Products to be independently certified by UL Environment in accordance with "UL 2818 -GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings."
- B. Comply with California Department of Public Health "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1" (CA Section 01 35 00 - Special Procedures) and V1.2-2017.

2.05 SCOPE OF WORK

- A. 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. Cementitious material and soffits where indicated.
 - 3. Concrete walls where indicated.
 - 4. Hollow metal doors and frames where indicated.
- B. 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 remain unfinished.
 - 3. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
 - 4. Marble, granite, slate, and other natural stones.
 - 5. Brick and cast stone.
 - 6. Glass.
 - 7. Ferrous and Galvanized Metal (primed and un-primed).

2.06 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.07 ACCESSORY MATERIALS

A. Accessory Materials: Cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

2.08 APPLICATION EQUIPMENT

- A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint, and as approved by the Architect.
- B. Prior to use of application equipment, verify that the proposed equipment is actually compatible with the materials to be applied, and that integrity of the finish will not be jeopardized by use of the proposed equipment.

2.09 EXTERIOR PAINTING SCHEDULE

- A. Exterior Concrete (if applicable): Provide the following finish systems over exterior concrete substrates.
 - 1. Two finish coats over a primer.
 - a. Primer: Sherwin Williams; S-W Loxon Concrete and Masonry Primer Sealer, A24W8300.
 - 1) Except for "touch-up" prime coat may be omitted.
 - b. Finish Coats (2): Sherwin Williams; A-100® Exterior Latex Satin, A82 Series.
- B. Exterior Ferrous and Non-Ferrous (Galvanized) Metal: Provide the following finish systems over exterior ferrous and non-ferrous metal.
 - 1. Two finish coats over a rust-inhibitive primer.
 - 2. Primer: Sherwin Williams; S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.

- a. Galvanized Metal Surfaces: Chemically treat with a compound designed for this purpose in accordance with the manufacturer's directions before applying the first coat of primer.
- b. Shop Primed Surfaces: Except for "touch-up" prime coat may be omitted.
- 3. Finish Coats (2): Sherwin Williams; Pro Industrial[™] Acrylic Semi-Gloss, B66-650 Series.

2.10 SOURCE QUALITY CONTROL

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. 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.

3.02 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Remove or repair existing paints or finishes that exhibit surface defects.
- C. Remove or mask surface appurtenances prior to preparing surfaces for finishing.
- D. Surface Preparation:

a.

- 1. Mildew Removal: Prior to painting.
 - Bleach Solution: 1 part liquid household bleach, 3 parts warm water.
 - 1) Apply solution and scrub mildewed area.
 - 2) Allow solution to remain on surface for 10 minutes.
 - 3) Rinse thoroughly with clean water. Allow surface to dry before painting.
 - 4) Wear protective glasses or goggles, waterproof gloves, and protective clothing.
 - 5) Quickly wash off any of the mixture coming in contact with your skin.
 - 6) Do not add detergents or ammonia to the bleach/water solution.
- 2. Concrete:
 - a. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - b. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- 3. Masonry:
 - a. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 - b. Prepare surface as recommended by top coat manufacturer.
 - c. Clean surfaces with pressurized water. Use pressure range of 600 to 1500 psi (4140 to 10,350 kPa) at 6 to 12 inches (150 to 300 mm). Allow to dry.

- 4. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- 5. Exterior Gypsum Board: Fill minor defects with exterior filler compound. Spot prime defects after repair.
- 6. Exterior Plaster: Fill hairline cracks, small holes, and imperfections with exterior patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- 7. 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.
- 8. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- 9. Galvanized Surfaces:
 - a. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - b. Prepare surface according to SSPC-SP 2.
- E. Ferrous Metal Surfaces: Remove rust, loose mill scale, and other foreign substances using any of the following methods:
 - 1. Solvent Clean according to SSPC-SP 1.
 - 2. Hand Tool Clean according to SSPC-SP 2.
 - 3. Power Tool Clean according to SSPC-SP 3.
- F. Material Preparation: Carefully mix and prepare costing materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying coating in a clean condition, free of foreign materials and residue.
 - 2. Stir material before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
 - 3. Use only the type of thinners approved by manufacturer and only within recommended limits.

3.03 INSTALLATION

- A. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendation.
- B. Do not apply to wet or damp surfaces.
- C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 - 1. The number of coats and film thickness required is the same regardless of application method.
 - 2. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.
- D. Uniformly apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, drips or sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Apply coatings at spreading rate required to achieve the manufacturer's recommended dry film thickness.
- F. Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface without surface defects visible from 5 feet (1.5 m).
- G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- H. Sand metal surfaces lightly between coats to achieve required finish.

3.04 FIELD QUALITY CONTROL

- A. Painted exterior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent upon inspection:
 - 1. Brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
 - 2. evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
 - 3. Damage due to touching before paint is sufficiently dry or any other contributory cause.
 - 4. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
 - 5. Damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).
- B. Painted surfaces shall be considered unacceptable if any of the following are evident under daylight conditions for exterior surfaces:
 - 1. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm (39").
 - 2. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm (39").
 - 3. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.

3.05 PAINT MATERIAL DISPOSAL

A. Refer to Section 09 91 23 - Interior Painting for requirements.

3.06 CLEANING

- A. Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
- B. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

3.07 PROTECTION AND REPAIR

- A. Provide "Wet Paint" signs to protect newly painted finishes.
- B. Protect work of other trades against damage from painting by providing surface-applied protection prior to preparation and painting. After completing painting operations, remove temporary protective wrappings.
- C. Protect completed coating applications from damage by subsequent construction activities until completion of painting project.
- D. Touch-up coatings damaged by subsequent construction activities.

END OF SECTION

SECTION 09 91 23 INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation and the field application of paints, stains, and varnishes on interior substrates (i.e. steel, galvanized metal, aluminum, wood, masonry, gypsum board, etc.) as indicated in the drawings and specified below.

1.02 RELATED REQUIREMENTS

- A. Section 079200 Joint Sealants
- B. Section 09 21 16 Gypsum Board Assemblies

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.
- B. Gloss Levels, according to ASTM D523:
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees.
 - 6. Gloss Level 6: 70 to 85 units at 60 degrees.
 - 7. Gloss Level 7: More than 85 units at 60 degrees.

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 D16 Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. ASTM D4442 Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- D. ASTM D523 Standard Test Method for Specular Gloss; 2014.
- E. MPI (APL) Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.
- F. MPI (APSM) Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- G. SSPC-PA 1 Shop, Field, and Maintenance Painting of Steel; 2004.
- H. SSPC-SP 13 Surface Preparation of Concrete; (Reaffirmed 2015); 2003.

1.05 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each type of topcoat product:
 - 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.
 - 4. VOC Content.
- B. Samples: Submit two 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.
 - 2. Allow 30 days for approval process, after receipt of complete samples by Architect.

- a. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished metals, have been approved.
- C. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. 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.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Deliver extra paint for Owner's use in maintenance. Label and store where directed by the Owner including codes used on the Drawings. Do not deliver to the Project site until the Owner is prepared to receive and store maintenance materials.
 - 1. Paint: For each color and material specified, furnish quantity of unopened 1-gallon cans equal to no less than 5 percent of quantity installed. Paint must be from the same product run.

1.07 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.

1.08 COORDINATION:

- A. Provide finish coats which are compatible with the prime coats actually used.
- B. Review other Sections of these Specifications as required, verifying the primer coats to be used and assuring compatibility of the total coating system for the various substrate.
- C. Furnish information on the characteristics of the specific finish materials to assure that compatible primer coats are used.
- D. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required.
- E. Notify the Architect in writing of anticipated problems in using the specified coating system over prime-coatings supplied under other Sections.

1.09 MOCK-UP

- A. Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 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.

1.11 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.

1.12 MATERIAL DISPOSAL

- A. Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Obtain information on these controls from the Authority having jurisdiction.
- B. All waste materials shall be separated and recycled. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility. Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
- C. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
- D. To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground, the following procedures shall be strictly adhered to:
 - 1. FLOOR DRAINS OR SINKS CONNECTED TO THE BUILDING SANITARY SEWERE SYSTEM SHALL NOT BE USED TO CLEAN BRUSHES, EQUIPMENT, ETC.
 - 2. Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
 - 3. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - 4. Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - 5. Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
 - 6. Empty paint cans are to be dry prior to disposal or recycling (where available).
 - 7. Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
 - 8. Set aside and protect surplus and uncontaminated finish materials not required by the Owner and deliver or arrange collection for verifiable re-use or re-manufacturing.

1.13 GUARANTEE

A. Furnish either the local MPI Accredited Quality Assurance Association's two (2) year guarantee, or, alternatively, a 100% two (2) year Maintenance Bond - both in accordance with MPI Painting Manual requirements. The Maintenance Bond shall warrant that all painting work has been performed in accordance with MPI Painting Manual requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturers: The Sherwin-Williams Paint Company;
 - 1. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.
 - 2. Manufacturer Contacts:

a. Local Sales Rep: Brook Nienstedt: P: (913) 381-8633 / E-mail: brook.b.nienstedt@sherwin.com.

2.02 PAINT - GENERAL REQUIREMENTS

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
- B. MPI Standards: Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
- C. 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.
- D. Unless noted otherwise, typical paint system consists of:
 - 1. One (1) Coat of Primer/Filler
 - 2. One (1) Intermediate Coat
 - 3. One (1) Top Coat
- E. Tinting of Paint Finishes: Tint each coat as follows:
 - 1. Primer Coat: Do <u>NOT</u> tint primer coat.
 - 2. Intermediate Coat/s: Tint intermediate coat/s as base color, applied with a FLAT sheen.
 - 3. Top Coat: Final finish coat shall be applied as base color with the specified sheen.
- F. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- G. Material Compatability:
 - 1. 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.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- H. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in 40 CFR 59, Subpart D (EPA Method 24) National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - a. Flat Paint and Coatings: 50 g/L, maximum.
 - b. Non-Flat Paint and Coatings: 150 g/L, maximum.
 - c. Primers. Sealers. and Undercoaters: 200 g/L.
 - d. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - e. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - f. Pretreatment Wash Primers: 420 g/L.
 - g. Floor Coatings: 100 g/L.
 - h. Shellacs, Clear: 730 g/L.
 - i. Shellacs, Pigmented: 550 g/L.
 - 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.
- I. Flammability: Comply with applicable code for surface burning characteristics.

2.03 PAINT FINISHES - COLOR AND SHEEN

- A. Paint Finishes, types designated in the drawings as Finish Type P-#.
 - 1. Refer to the "Interior Finish Legend" (Sheet A4.2) for the manufacturer, color number, color name, sheen, and other pertinent information for the paints specified.
- B. Colors: As scheduled.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

2.04 SOURCE QUALITY CONTROL

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished, with Applicator present, prior to commencement of work. Report any condition that may potentially effect proper application.
- C. 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.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. 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 Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 1. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- G. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
- H. 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.
- I. Gypsum Board Substrates: Fill minor defects with filler compound. Spot prime defects after repair.
- J. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

- K. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- L. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- M. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - a. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tinting:
 - 1. Tint intermediate coat/s to match color of finish topcoat, but provide FLAT sheen to distinguish each separate coat. Do NOT tint primer coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
 - 1. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Prime surfaces to receive wall coverings.
 - 3. Painting of Exposed Roof Structure:
 - a. In finished occupied areas, paint roof deck, bar joists, girders, beams, and columns, unless otherwise indicated.
 - 4. Painting of Mechanical and Electrical Materials Exposed to View:
 - a. In finished occupied 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 that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - d. Paint dampers exposed behind louvers and grilles to match face panels.
- H. Do NOT paint or finish the following work 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.
- 5. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
- 6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
- 7. Marble, granite, slate, and other natural stones.
- 8. Floors, unless specifically indicated.
- 9. Ceramic and other tiles.
- 10. Glass.
- 11. Wall, ceilings, floors, and mechanical/electrical work located in utility, mechanical, and electrical spaces, unless indicated otherwise.
- 12. Acoustical materials, unless specifically indicated.
- 13. Concealed pipes, ducts, and conduits.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FIELD QUALITY CONTROL

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

3.05 CLEANING AND PROTECTION

- A. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
- B. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 - 1. Refer to "Material Disposal" Article in this Section.
- C. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

PART 4 - PAINT SCHEDULE

4.01 INTERIOR COATING SYSTEMS - WALL SURFACES

- A. Concrete and Concrete Masonry Units (CMU):
 - 1. Latex System:
 - a. Semi-Gloss Finish:
 - 1) Filler: PrepRite® Block Filler, B25W25
 - 2) Intermediate Coat: ProMar® 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 Series
 - 3) Top Coat: ProMar® 200 Zero VOC Interior Latex Semi-Gloss, B31-2600 Series
 - b. Eg-Shel Finish:
 - 1) Filler: PrepRite® Block Filler, B25W25

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- 2) Intermediate Coat: ProMar® 200 Zero VOC Interior Latex Eg-Shel, B20-2600 Series
- 3) Top Coat: ProMar® 200 Zero VOC Interior Latex Eg-Shel, B20-2600 Series
- Pre-Catalyzed Waterbased Epoxy System:
- a. Semi-Gloss Finish:
 - 1) Primer: PrepRite® Block Filler, B25W25
 - 2) Intermediate Coat: Pro Industrial[™] Pre-Catalyzed Waterbased Epoxy, Semi-Gloss, K46-151 Series
 - Top Coat: Pro Industrial[™] Pre-Catalyzed Waterbased Epoxy, Semi-Gloss, K46-151 Series
 - b. Eg-Shel Finish:
 - 1) Filler: PrepRite® Block Filler, B25W25
 - Intermediate Coat: Pro Industrial[™] Pre-Catalyzed Waterbased Epoxy Eg-Shel, K45-151 Series
 - Top Coat: Pro Industrial[™] Pre-Catalyzed Waterbased Epoxy Eg-Shel, K45-151 Series
- B. Gysum Board Substrates:
 - 1. Institutional Low-Odor/VOC Interior Latex System:
 - a. Eg-Shel Finish:
 - 1) Primer: Harmony Interior Latex Primer, B11W900 Series
 - 2) Intermediate Coat: Harmony Interior Latex Flat
 - 3) Top Coat: Harmony Interior Latex Eg-Shel, B9 Series
 - 2. Interior Epoxy-Modified Latex System:
 - a. Gloss Finish:
 - 1) Primer: ProMar® 200 Zero VOC Latex Primer, B28W2600
 - Intermediate Coat: Pro Industrial[™] Waterbased Catalyzed Epoxy Gloss, B73-300 Series
 - 3) Top Coat: Pro Industrial[™] Waterbased Catalyzed Epoxy Gloss, B73-300 Series

4.02 INTERIOR COATING SYSTEMS - CEILING AND SOFFIT SURFACES

- A. <u>Gypsum Board</u>:
 - 1. Institutional Low Odor/VOC Interior Latex System:
 - a. Flat Finish:
 - 1) Primer: Harmony Interior Latex Primer, B11W900 Series
 - 2) Intermediate Coat: Harmony Interior Latex Flat, B9 Series
 - 3) Top Coat: Harmony Interior Latex Flat, B9 Series

4.03 INTERIOR COATING SYSTEMS - FLOOR SURFACES

A. <u>Concrete Floors</u>:

a.

- 1. Light Duty Industrial Floor Coatings:
 - a. Acrylic Systems:
 - 1) 1st Coat: ArmorSeal® Tread-Plex[™] Waterbased Acrylic Primer , B90 Series
 - 2) 2nd Coat: ArmorSeal® Tread-Plex[™], B90 Series
 - 3) 3rd Coat: ArmorSeal® Tread-Plex[™], B90 Series
- 2. Moderate Duty Industrial Floors:
 - Water Based Epoxy Primer / Water Based Epoxy Coating System:
 - 1) 1st Coat: ArmorSeal Water Based Epoxy Primer/Sealer Clear, B70VQ10
 - 2) 2nd Coat: ArmorSeal® 8100 Water Based Epoxy, B70-8100 Series
 - 3) 3rd Coat: ArmorSeal® 8100 Water Based Epoxy, B70-8100 Series
 - b. Epoxy System:
 - 1) 1st Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series
 - 2) 2nd Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series
 - 3) 3rd Coat (optional): ArmorSeal 1000 HS Epoxy, B67-2000 Series
- 3. Heavy Duty Industrial Floors:
 - a. Epoxy / HS Polyurethane System:

- 1) 1st Coat: ArmorSeal 1000 HS Epoxy, B67-2000 Series
- 2) 2nd Coat: ArmorSeal HS Polyurethane, B65-220 Series
- 3) 3rd Coat (optional): ArmorSeal HS Polyurethane, B65-220 Series
- B. <u>Wood Floors</u>:
 - 1. Semi-Transparent Stain Finish:
 - a. 1st Coat: S-W Minwax Performance Series Tintable Wood Stain 550 VOC
 - b. 2nd Coat: S-W Minwax Waterbased Oil-Modified Polyurethane
 - c. 3rd Coat: S-W Minwax Waterbased Oil-Modified Polyurethane
 - d. Sheen: Gloss, Semi-Gloss, Satin
 - 2. Clear Finish: Polyurethane
 - a. 1st Coat: S-W Minwax Fast Drying Polyurethane Varnish
 - b. 2nd Coat: S-W Minwax Fast Drying Polyurethane Varnish
 - c. Sheen: Gloss, Semi-Gloss, Satin

4.04 INTERIOR COATING SYSTEMS - WOOD SURFACES

- A. Opaque Finishes: Provide the following opaque paint finish systems over interior wood surfaces, if indicated in the drawings:
 - 1. Waterbased/Alkyd Urethane System:
 - a. Gloss Finish:
 - 1) Primer: S-W Premium Wall & Wood Primer, B28W8111 Series
 - 2) Intermediate Coat: Pro Industrial Waterbased Alkyd Urethane Gloss, B53-1050 Series
 - 3) Top Coat: Pro Industrial Waterbased Alkyd Urethane Gloss, B53-1050 Series
 - b. Semi-Gloss Finish:
 - 1) Primer: S-W Premium Wall & Wood Primer, B28W8111 Series
 - 2) Intermediate Coat: Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150 Series
 - Top Coat: Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150 Series
 - 2. Latex System:
 - a. Gloss Finish:
 - 1) Primer: PrepRite® ProBlock® Latex Primer/Sealer, B51-620 Series
 - 2) Intermediate Coat:ProMar 200 Zero VOC Gloss, B21-12650 Series
 - 3) Top Coat: ProMar 200 Zero VOC Gloss, B21-12650 Series
 - b. Semi-Gloss Finish:
 - 1) Primer: PrepRite® ProBlock® Latex Primer/Sealer, B51-620 Series
 - 2) Intermediate Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series
 - 3) Top Coat: ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series
 - 3. Water-Based Light Industrial Coating System:
 - a. Semi-Gloss Finish:
 - 1) Primer: PrepRite® ProBlock® Latex Primer/Sealer, B51 Series
 - 2) Intermediate Coat: Pro Industrial[™] Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46-151 Series
 - Top Coat: Pro Industrial[™] Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46-151 Series
- B. Clear Finishes:
 - 1. Polyurethane System
 - a. 1st Coat:S-W Minwax Fast Drying Polyurethane, Satin
 - b. 2nd Coat: S-W Minwax Fast Drying Polyurethane, Satin
 - 2. Alkyd System:
 - a. 1st Coat: S-W Minwax Performance Series Fast-Dry Sanding Sealer
 - b. 2nd Coat: S-W Minwax Performance Series Fast-Dry Oil Varnish, Satin
 - 3rd Coat: S-W Minwax Performance Series Fast-Dry Oil Varnish, Satin
- C. Semi-Transparent Finishes:

- 1. Polyurethane (topcoat):
 - a. 1st Coat: S-W Minwax Performance Series Tintable Wood Stain 250
 - b. 2nd Coat: S-W Minwax Fast Drying Polyurethane Varnish, Satin
 - c. 3rd Coat: S-W Minwax Fast Drying Polyurethane Varnish, Satin
- 2. Alkyd (topcoat):
 - a. 1st Coat: S-W Minwax Performance Series Tintable Wood Stain 250 VOC
 - b. 2nd Coat: S-W Minwax Performance Series Fast-Dry Sanding Sealer
 - c. 3rd Coat: S-W Minwax Performance Series Fast-Dry Oil Varnish, Satin
 - d. 4th Coat: S-W Minwax Performance Series Fast-Dry Oil Varnish, Satin

4.05 INTERIOR COATING SYSTEMS - METAL SURFACES

- A. <u>Ferrous Metal</u>: Includes, but not limited to, interior metal doors, door frames and miscellaneous metals, if indicated in the drawings:
 - 1. Latex System:
 - a. Semi-Gloss Finish:
 - 1) Primer: Pro Industrial[™] Prep-Ritel® Bonding Primer, XXX Series (MPI #17)
 - (a) Shop Primed Surfaces: Except for "touch-up," prime coat may be omitted. Verify compatibility and application of finish coat over shop primer with paint manufacturer.
 - 2) Intermediate Coat: Pro Industrial[™] Acrylic Semi-Gloss, B66-650 Series
 - 3) Top Coat: Pro Industrial[™] Acrylic Semi-Gloss, B66-650 Series
- B. Non-Ferrous (Galvanized) Metal Substrates:
 - 1. Latex System:
 - a. Semi-Gloss Finish:
 - 1) Primer: Pro Industrial[™] Pro-Cryl[®] Universal Primer, B66-310 Series
 - (a) Shop Primed Surfaces: Except for "touch-up," prime coat may be omitted. Verify compatibility and application of finish coat over shop primer with paint manufacturer.
 - 2) Intermediate Coat: Pro Industrial™ Acrylic Semi-Gloss, B66-650 Series
 - 3) Top Coat: Pro Industrial[™] Acrylic Semi-Gloss, B66-650 Series
 - 2. Epoxy-Modified Latex System:
 - a. Gloss Finish:
 - 1) Primer: Pro Industrial[™] Pro-Cryl[®] Universal Primer, B66-310 Series
 - Intermediate Coat: Pro Industrial[™] Water Based Catalyzed Epoxy Gloss, B73-300 Series
 - 3) Top Coat: Pro Industrial[™] Water Based Catalyzed Epoxy Gloss, B73-300 Series
 - 3. Pre-Catalyzed Waterbased Epoxy System:
 - a. Semi-Gloss Finish:
 - 1) Primer: Pro Industrial[™] Pro-Cryl[®] Universal Primer, B66-310 Series
 - 2) Intermediate Coat: Pro Industrial[™] Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46 Series
 - Top Coat: Pro Industrial[™] Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46 Series
- C. <u>Ferrous and Non-Ferrous Metals at Exposed Ceiling Conditions</u>:
 - 1. Exposed roof structure and overhead-mounted services in utilitarian spaces shall be painted, to include steel roof decking, bar joists, structural steel, metal fabrications, ductwork, conduit, piping, etc.
 - 2. Ferrous and Non-Ferrous Metals:
 - a. Latex Dryfall:
 - 1) Eg-Shel Finish:
 - (a) Primer: Pro Industrial[™] Pro-Cryl[®] Universal Primer, B66-310 Series
 - (1) Shop Primed Surfaces: Except for "touch-up," prime coat may be omitted. Verify compatibility and application of finish coat over shop primer with paint manufacturer.

- (b) Top Coat: Pro Industrial[™] Waterborne Acrylic Dryfall Eg-Shel, XX Series, (MPI #155)
- (c) 2nd coat (as required): Pro Industrial[™] Waterborne Acrylic Dryfall Eg-Shel, XX Series (MPI #155)
- 2) Flat Finish:
 - (a) Primer: Pro Industrial[™] Pro-Cryl[®] Universal Primer, B66-310 Series
 - (1) Shop Primed Surfaces: Except for "touch-up," prime coat may be omitted. Verify compatibility and application of finish coat over shop primer with paint manufacturer.
 - (b) Top Coat: Pro Industrial[™] Waterborne Acrylic Dryfall Flat, B42-80 Series, (MPI #118)
 - (c) 2nd coat (as required): Pro Industrial[™] Waterborne Acrylic Dryfall Flat, B42-80 Series (MPI #118)

END OF SECTION

SECTION 10 26 01

WALL PROTECTION AND CORNER GUARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Corner guard systems.
- B. Wall protection panel systems.

1.03 RELATED SECTIONS

Section 06 10 00 - Rough Carpentry

Section 09 21 16 - Gypsum Board Assemblies

1.04 REFERENCE STANDARDS

- A. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- 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 E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- E. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials; 2016a.

1.05 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for additional requirements.
- B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
- C. Samples: Submit two sections of corner guard, 12 inch (____ mm) long, illustrating component design, configuration, color and finish.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an installer who has no less than 3 years experience in installation of systems similar in complexity to those required for this project.
- B. Manufacturer's Qualifications: Not less than 5 years experience in the production of specified products and a record of successful in-service performance.
- C. Code compliance: Assemblies should conform to all applicable codes.

1.07 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five (5) years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturers: Construction Specialties, Inc. (C/S).
 - 1. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.

2.02 PERFORMANCE REQUIREMENTS

- A. Materials shall meet or exceed the following performance requirements:
 - 1. Surface Burning Characteristics: Provide Class A/1 assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - 2. Fire Resistance: Where fire rating is specified for the wall in which the guard is mounted, provide assemblies that have been tested in accordance with ASTM E119 for the same rating as the wall.
 - 3. Structural:
 - a. Resist lateral impact force of 100 lbs (445 N) at any point without damage or permanent set.
 - b. Support vertical live load of 100 lb/lineal ft (1,400 N/m) with deflection not to exceed 1/50 of span between supports.
 - 4. Impact strength: Provide wall protection components that have been tested in accordance with the applicable provisions of ASTM F476.
 - 5. Chemical- and Stain-Resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.

2.03 WALL PROTECTION COMPONENTS

- A. Wall Protection Components, scheduled on the Drawings as Finish Type WP-XX.
 - 1. Basis of Design: Refer to the "Interior Finish Legend" (Sheet A7.5) for pertinent information regarding the wall protection products specified in the section.

2.04 CORNER GUARDS

- A. Corner Guards, scheduled on drawings as Finish Type CG-XX.
 - 1. Basis of Design: Refer to the "Interior Finish Legend" (Sheet A7.5) for pertinent information regarding the corner guard products specified in the section.
- B. Surface-Mounted Corner Guard, Type CG- 1:
 - 1. Product: C/S Acrovyn, Model No. SSM-20AN; Surface-mounted corner guard.
 - a. Configuration: 90-degree corner.
 - b. Retainer: Continuous aluminum.
 - c. Cover: Acrovyn 4000, with preformed end caps.
 - d. Width of Wings: 2 inches (51 mm).
 - e. Corner: Radiused 1/4-inch.
 - f. Color: As scheduled.
 - g. Length: Full height of wall, less height of wall base.
 - h. Installation: Mount to wall at top of wall base.
 - 2. Materials:
 - a. Engineered PETG: Extruded material should be high-impact Acrovyn 4000 with Shadowgrain texture, nominal .078" (1.98mm) thickness. Chemical and stain resistance should be per ASTM D543 standards as established by the manufacturer.
 - b. Aluminum: Extruded aluminum retainers should be 6063-T6 alloy, nominal .062" (1.57mm) thickness per ASTM B221.
 - 3. Performance: Refer to "Performance Requirements" Article this Section.

2.05 WALL PROTECTION PANELS

- A. Wall Protection Panels, scheduled on the Drawings as Finish Type WP-XX.
 - 1. Basis of Design: Refer to the "Interior Finish Legend" (Sheet A7.5) for pertinent information regarding the wall protection panels specified in the section.
- B. Wall Protection Panels, Type WP-1:
 - 1. Product: C/S; Acrovyn 0.040N Sheet; High-Impact Wallcovering.
 - 2. Description: Engineered PETG rigid sheet to be high-impact Acrovyn 4000 with standard Suede texture, nominal 0.040 inch thickness. Chemical and stain resistance shall comply with ASTM D543.
 - 3. Color: As scheduled.

- 4. Sheet Size:
 - a. Solid Colors: 4-feet by 8-feet or 4-feet by 10-feet.
 - b. Chameleon Simulated Patterns: 4-feet by 10-feet.
- 5. Materials:
 - a. Engineered PETG, Extruded material shall be high-impact Acrovyn 4000. Chemical and stain resistance should be per ASTM D543 standards as established by the manufacturer.
 - b. Aluminum: Aluminum trims (optional) to be alloy 6063 T5 with clear or colored anodized finish; minimum strength and durability properties as specified in ASTM B221.
 - c. Adhesive: Acrovyn Wall Panels shall be furnished as a complete packaged system, including appropriate standard adhesive.
- 6. Accessories:
 - a. Adhesive: Wall covering shall be furnished as a complete packaged system, including appropriate standard adhesive.
 - b. Primer, caulk and trims available for purchase.
- 7. Performance: Refer to "Performance Requirements" Article this Section.

2.06 FABRICATION

- A. General: Fabricate wall covering to comply with requirements indicated for design, dimensions, detail, finish and sizes.
- B. Fabricate components with tight joints, corners and seams.
- C. Pre-drill holes for attachment.
- D. 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.

3.02 PREPARATION

A. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

3.03 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.
- B. Position corner guard at the top of the wall base.

3.04 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).

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets and accessories.

1.03 RELATED SECTIONS

- A. Section 06 10 00 Rough Carpentry.
- B. Section 09 91 23 Interior Painting.

1.04 REFERENCE STANDARDS

- A. 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; 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 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. ASTM E814 Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- F. FM (AG) FM Approval Guide; current edition.
- G. NFPA 10 Standard for Portable Fire Extinguishers; 2013.
- H. UL (DIR) Online Certifications Directory; current listings at database.ul.com.

1.05 SUBMITTALS

- A. See Section 01 33 00 Submittal Procedures, for additional requirements.
- B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
 - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- C. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- 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.

1.06 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.
- B. Provide fire protection specialties produced by a single manufacturer.
- C. Provide fire extinguishers of type approved by UL, State Fire Marshal's Office, and local regulatory agencies, if any.

1.07 COORDINATION

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

1.08 WARRANTY

- A. Fire Extinguishers: The manufacturer shall warrant the product/s to be free of defects in material and workmanship under conditions of normal use for a period of six (6) years from Date of Substantial Completion.
- B. All Fire Protection Products (except fire extinguishers) carry a one year warranty from the Date of Substantial Completion against defects in materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer/s:
 - 1. Fire Extinguishers: J.L. Industries.
 - a. Contacts: P: (800) 554-6077 / Email: sales@activarcpg.com / Web: www.activar cpg.com
 - 2. FireExtinguisher Cabinets: Larsen's Manufacturing Company.
 - a. Contacts: P: (800) 527-7367 / Web: www.larsensmfg.com
- B. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - 1. Kidde (United Technologies).
 - 2. Ansul (Tyco).
 - 3. Nystrom, Inc.
 - 4. Potter-Roemer.
 - 5. Pyro-Chem (Tyco).

2.02 MATERIALS

- A. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
 - 1. Thickness: 0.036 inches, minimum.
 - 2. Finish: Baked enamel paint finish.
 - 3. Color: As selected by Architect.
- B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A653/A653M, G90 (Z275) coating designation.
- C. Aluminum: ASTM B221 (ASTM B221M), with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet, 0.063 inch (1.6 mm) thick.
 - 1. Finish: Baked enamel paint finish.
 - 2. Color: Light bronze or As selected by Architect from Manufacturer's standard colors.

2.03 FIRE EXTINGUISHERS

- A. General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Fire Extinguisher, Type A:
 - 1. Multi-Purpose Chemical Type: Extinguisher unit containing a fluidized and siliconized mono ammonium phosphate powder; nonconductive and nontoxic.
 - 2. Product: JLI; Cosmic Series, Model 10E
 - a. Nominal Capacity: 10 pound (4.54 kg)

- b. Construction: Heavy duty steel cylinder with metal valve and siphon tube, O-ring seal, replaceable valve stem seal, visual pressure gage, pull pin and upright squeeze grip.
- c. Finish: Factory powder-coated; Red.
- d. Effectiveness (Rating): Class A, B, and C fires.
- e. UL Rating:4A-80B:C.
- f. Size: 5-inch diameter / 21-inches high.
- C. Fire Extinguisher, Type K:
 - 1. Class K Wet Chemical Type: Extinguisher unit containing a low "pH" potassium acetate solution.
 - 2. Product: JLI; Saturn Series, Model 15.
 - a. Size: 1.8 gallons (6.8 L).
 - b. Construction: Stainless steel cylinder with protective nozzle tip orifice seal and nonmetallic nozzle tip finger guard, O-ring seal, replaceable valve stem seal, visual pressure gage, pull pin, and upright squeeze grip.
 - c. Effectiveness (Rating): Class A, K fires.
 - d. UL Rating: (C)1-A:K.
 - e. Size: 7-inch diameter / 19-1/4 inches overall height.

2.04 SEMI-RECESSED FIRE PROTECTION CABINETS

- A. General Specifications:
 - 1. Cabinet Configuration: Semi-recessed type.
 - a. Sized to accommodate accessories.
 - b. Interior Dimensions of Cabinets: 9-1/2 inches wide by 24-inches high by 6-inches deep, typical unless noted otherwise.
 - c. Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.
 - d. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
 - 2. Cabinet Box:
 - a. Non-Fire-Rated Cabinets:
 - 1) Formed 0.036 inch (0.9 mm) thick steel sheet with white baked enamel finish.
 - b. Fire-Rated Cabinets:
 - 1) Construction: Shall have double wall of formed 0.036 inch (0.9 mm) thick steel sheet with white baked enamel finish. The space between the double walls shall be lined with 5/8 inch (15.9 mm) thick fire barrier material.
 - 2) Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
 - 3. Cabinet Exterior Trim and Door:
 - a. Material: Type 304 stainless steel with a #4 finish.
 - b. Door Style: Vertical Duo.
 - c. Door Glazing:
 - 1) Tempered glass, clear, 1/8 inch (3 mm) thick, and set in resilient channel glazing gasket.
 - d. Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - 1) Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
 - 2) Fabricate door frames of one-piece construction with edges flanged.
 - 3) Miter and weld perimeter door frames.
 - 4. Door Hardware:
 - a. Catch: Self-adjusting roller catch.
 - b. Hinge: Continuous piano hinge capable of opening 180-degress.
 - c. Door Pull: Satin finish pull handle.
 - 5. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

- B. Non-Rated Semi-Recessed Cabinet, Type FEC:
 - 1. Product: Larsen's; "Architectural Series", Model No. 2409-6R.
 - 2. For installation in non-rated wall construction.
 - 3. Fire Extinguisher: Provide one (1) fire extinguisher, Type A.
 - 4. Cabinet trim projection from wall: 2-1/2 inches, rolled edge.
 - 5. Rough Opening Depth: 4-inches, minimum. Coordinate with wall construction for proper clearance.

2.05 SOURCE QUALITY CONTROL

A. Ship extinguishers to the Project site fully charged, EXCEPT those which contain water as an extinguishing agent, if any.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets will be installed, and blocking where surface mounted cabinets will be installed.
 - 1. Notify the Contractor in writing of conditions detrimental to proper and timely completion of the installation.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install cabinets in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.
 - 1. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
 - 2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
 - 3. Maintain fire ratings where cabinets are recessed into fire-rated wall systems.

3.03 FIELD QUALITY CONTROL

A. Ensure that each extinguisher is fully charged, and that inspection of each extinguisher has been performed, as evidenced by the National Association of Fire Equipment Distributors certification tag, just prior to turnover.

END OF SECTION

SECTION 10 56 17

WALL MOUNTED STANDARDS AND SHELVING

PART 2 PRODUCTS

1.01 COMPONENTS

A. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions. Finish of exposed to view fasteners to match finish of standards and other components.

END OF SECTION

SECTION 12 32 16

MANUFACTURED PLASTIC LAMINATE FACED CASEWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

- A. Fixed modular plastic laminate clad casework and components.
- B. Plastic laminate countertops .
- C. Utility Shelving.

1.03 RELATED SECTIONS

- A. Section 06 10 00 Rough Carpentry
- B. Section 06 61 16 Solid Surface Fabrication
- C. Section 09 21 16 Gypsum Board Assemblies
- D. Section 09 91 23 Interior Painting
- E. Division 22 Plumbing
- F. Division 26 Electrical

1.04 REFERENCES

A. AWI Section 400 (Architectural Cabinets)

1.05 DEFINITIONS

- A. Definitions in the AWI/AWMAC/WI's "Architectural Woodwork Standards" apply to the Work of this Section.
- B. Manufactured Plastic Laminate Faced Casework (from here on referred to as "Casework") shall refer to laminated plastic casework, cabinets, shelving, counter, counters, related hardware and items indicated on the Drawings and specified.
- C. NEMA LD3 High Pressure Decorative Laminates (HPDL) Grades:
 - 1. Grade HGS (GP 50): Horizontal grade
 - 2. Grade VGS (GP-28): Vertical Grade
 - 3. Grade CLS (CL 20): Cabinet liner
 - 4. Grade BKL (BK 20): Backing sheet
- D. TFM: Thermally Fused Melamine-Clad Particleboard.
- E. LPDL: Low-Pressure Decorative Laminate.
- F. MDF: Medium Density Fiberboard.
- G. MR MDF: Moisture-Resistant MDF.

1.06 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated.

1.07 QUALITY ASSURANCE

- A. Manufacturer: Minimum of 5 years experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.
- B. Manufacturer: Provide products certified as meeting or exceeding ANSI-A 161.1-2000 testing standards.

- C. Single Source Manufacturer: Casework, countertops and architectural millwork products must all be engineered and built by a single source manufacturer in order to ensure consistency and quality for these related products. Splitting casework, countertops and/or architectural millwork between multiple manufacturers will not be permitted.
- D. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- E. Quality Standard: AWI standards are used to establish the minimum standard for casework construction to be provided on the project. AWI Section 400 (Architectural Cabinets) shall apply unless the Contract Documents specifies otherwise.
 - 1. Provide labels and certificates from AWI certification program indicating that casework, including installation, complies with requirements of grades specified.
 - 2. The following specifications are based on laminated plastic casework which shall be "Premium" grade as indicated and defined by the American Woodworking Institute (AWI).

1.08 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop drawings: Include plans, elevations, sections, details, and attachments to other work. Approved shop drawings and field verifications shall be obtained prior to fabrication.
- C. Keying Schedule: Include keying chart indicating whether cabinets, by room, are keyed alike or keyed differently and the quantity of master keys required.
- D. Samples for Verification: For the following:
 - 1. Laminate for each pattern selected.
 - 2. PVC edging for each pattern selected.
 - 3. Thermally fused melamine for each pattern selected.
 - 4. Hardware for each finish selected.
 - 5. Cabinet Sample: Submit full size, production type sample of a plastic laminate base cabinet showing complete construction details in accordance with the Contract Documents. Sample shall include one drawer, one shelf, service fittings, cabinet hardware, and a countertop.
 - a. Sample shall be delivered within 30 calendar days from contract date, at no cost to the Architect or Owner. Miniature "show room" type samples are not acceptable.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet minimum requirements for building conditioning for installation of finishes.
- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.11 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

- a. Delamination of components or other failures of glue bond.
- b. Warping of components.
- c. Failure of operating hardware.
- 2. Warranty Period: One (1) year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Casework products from <u>Advanced Cabinet Systems (ACS)</u> are specified to establish a standard of quality for design, function, materials, and appearance.
 - 1. Other Manufacturers: The following manufacturers are approved to provide materials or products that are equivalent to the "Basis of Design":
 - a. Precision Millwork
 - b. Creative Associates
 - c. Stevens Industries
 - d. LSI Corporation
 - e. Case Systems
 - f. TMI Systems Corporation
 - g. FADCO
- B. Substitutions: See Section 01 25 00.
 - 1. Approved equal does not imply acceptance of that manufacturer's "standard" construction and/or materials. Materials and construction shall comply in minimum with the AWI standards.

2.02 CASEWORK - GENERAL

- A. Quality Standard: Perform work to meet the requirements of 'Premium' Grade in accordance with the "Architectural Woodwork Standards (AWS)".
- B. Design:
 - 1. Cabinet Style:
 - a. Flush overlay with concealed hinges.
- C. Cabinet Grain Direction for Wood Grain Plastic Laminate:
 - 1. Vertical on door and drawer fronts with continuous vertical matching.
 - 2. Vertical on end panels.
 - 3. Side-to-side on bottoms and tops of units.
 - 4. Vertical on knee-space panels.
 - 5. Horizontal on aprons.

2.03 MATERIALS

- A. Lumber shall be in accordance with the AWS Grade specified for the product being fabricated. Moisture content shall be 6% to 12% for boards up to 2-inches nominal thickness, and shall not exceed 19% for thicker pieces.
- B. Particle Board: ANSI A208.1, Mat-Formed Particle Board, Grade M-2.
 - 1. Type: Particleboard with ultra-low emitting formaldehyde resins (ULEF).
 - 2. Sustainability: Carb II Compliant.
 - 3. Density: 45-pound, minimum.
 - 4. Internal Bond: 60 psi.
 - 5. Screw Holding Capacity: 225 lb. on faces and 200 lb. on edges, minimum.
- C. Hardboard: ANSI A135.4, Class 1, Tempered.
- D. Decorative Laminates: Shall be High Pressure Decorative Laminate (HPDL):
 - 1. Standards Compliance: NEMA LD 3, and ANSI A161.2 .
 - 2. Grades:
 - a. VGS: Vertical Grade, 0.028-inches thick.
 - b. HGS: Horizontal Grade, 0.048-inches thick.
 - c. HGP: Horizontal Grade, Post-formed, 0.039-inches thick.

- d. VGP: Vertical Grade, Post-Formed, 0.028-inches thick.
- e. HGF: Horizontal application, fire retardant material.
- f. VGF: Vertical application, fire retardant material.
- g. CLS: Cabinet Liner, 0.020-inches thick.
- h. BKH: Backer, 0.020-inches thick .:
- i. TFM: Thermally Fused Melamine Laminate Panels: Particleboard or MDF finished with 100-gram (minimum) thermally fused, melamine-impregnated decorative paper, and complying with requirements of NEMA LD 3, Grade <u>VGL for Test Methods 3.3</u>, 3.4, 3.6, 3.8, and 3.10. Finish shall be resistant to water and mild cleaners.
- E. Medium Density Fiberboard (MDF):
 - 1. Composition: Lignocellulosic fibers and no-added formaldehyde synthetic resin.
 - 2. ANSI A208.2 compliant, Grade 130.
- F. Moisture-Resistant MDF (MR-MDF): Where countertops receive sinks, lavatories, or are subjected to liquids:
 - Basis of Design: "Medex", as manufactured by Roseburg Forest Products Company.
 a. Standards Compliance:
 - 1) ANSI A208.2 Grade 155; MR50.
 - 2) <u>ASTM D1037</u>-06a: Passed the 6-Cycle Accelerated Aging Test.
 - 3) ASTM E84, Class C flame spread rating.
 - b. Density: 48 pcf, minimum.
- G. Edgebanding: Refer to "Edgebanding" Article this Section.
- H. Adhesives: Chemical-resistant waterproof adhesive as recommended by manufacturer of materials being joined.
 - 1. Do not use adhesives that contain urea formaldehyde.
- I. Joint Sealant: Mildew-resistant silicone sealant, white.

2.04 SURFACES

- A. Exposed Surfaces (Closed Interiors): Any closed storage unit behind solid door or drawer fronts. Surfaces visible when doors and drawers are closed, include:
 - 1. Door and Drawer Fronts; Exterior Faces: HPDL, Grade VGS.
 - 2. Exposed Ends: Any storage unit exterior side surface that is visible after installation: HPDL, Grade VGS.
 - 3. Exposed Bottoms of Wall Cabinets:
 - a. 48-inches or more above finished floor: HPDL, Grade VGS.
 - b. Less tha 48-inches above finished floor: HPDL , Grade HGS.
 - 4. Exposed Tops of Wall Cabinets, Tall Cabinets, and Hutches:
 - a. 80-inches or taller and <u>not</u> visible from above: HPDL, Grade VGS.
 - b. Less than 80-inches tall or visible from above: HPDL, Grade HGS.
 - 5. Edges: Refer to "Edgebanding" Article this Section.
- B. Open Interiors: Any open storage unit without solid door or drawer fronts, units with full glass insert doors and/or acrylic doors, and units with sliding solid doors.
 - 1. Open Cabinet Interior (Top, bottom, back sides, horizontal and vertical members): HPDL, Grade VGS.
 - 2. Open Cabinet Shelving: HPDL, Grade VGS.
 - 3. Edges: Refer to "Edgebanding" Article this Section.
- C. Semi-Exposed Surfaces: Surfaces behind opaque doors that are exposed, including:
 - Door and Drawer Fronts Interior: HPDL, Grade VGS.
 a. Color: Same color as cabinet interior.
 - 2. Cabinet Interior (Top, bottom, back sides, horizontal and vertical members): HPDL, Grade TFM; Color shall be White.
 - 3. Edges: Refer to "Edgebanding" Article this Section.

- D. Concealed Surfaces: Surfaces that are not visible after installation, including sleepers, web frames, dust panels, and ends and backs that are placed directly against walls or other cabinets; HPDL, Grade TFM, CLS, or BKH at Manufacturer's Option.
- E. Toekicks: Resilient base (by others).
- F. Wall Shelving on Standards and Brackets: HPDL, Grade HGS.1. Edges: Refer to "Edgebanding" Article this Section.
- G. Drawer Boxes: Clear Finish or Metabox (Contractor Option).

2.05 EDGEBANDING

- A. Material: Rigid PVC extrusion; through color with satin finish.
- B. Edge Banding Thickness:
 - 1. Cabinet Edges: 1-mm PVC.
 - 2. Door and Drawer Fronts: 3-mm PVC.
 - 3. Semi-Exposed Adjustable Shelves: 3-mm PVC, Front edge only.
 - 4. Exposed Adjustable Shelves: 3-mm PVC, Front edge only.
 - 5. Tops of Wall Cabinets, Tall Cabinets, and Hutches: 1-mm PVC.
 - 6. Wall Shelving (Standards & Brackets): 3-mm PVC, All four edges.
 - 7. Countertop: Refer to "Plastic Laminate Countertops" Article this Section.
- C. Color/s: Match scheduled plastic laminate materials.

2.06 CASEWORK FABRICATION

- A. Casework Construction: As required by referenced quality standard and the following:
- B. Cabinet Body Construction:
 - 1. General: <u>Balanced construction of all laminated panels is mandatory</u>. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), are not permitted.
 - 2. Tops, Bottoms and Side Panels:
 - a. Core Material (Typical): 3/4-inch thick particleboard core with HPDL or TFM finish depending on the exposure.
 - 1) Exception: Sink Cabinets: Core shall be 3/4-inch thick Moisture-Resistant MDF (MR-MDF) with HPDL or TFM finish depending on the exposure.
 - b. Side panels and vertical dividers shall receive adjustable shelf hardware at 32mm line boring centers. Mount door hinges, drawer slides and pull-out shelves in the line boring for consistent alignment.
 - c. Edgebanding: Refer to "Edgebanding" Article this Section.
 - 3. Back Panels:
 - a. Closed Cabinets: 1/2-inch thick particleboard core with HPDL or TFM finish depending on the exposure.
 - 1) Core Material (Typical): 1/2-inch thick particleboard core with TFM finish.
 - (a) Exception: Sink Cabinet shall be 1/2-inch thick Moisture-Resistant MDF (MR-MDF) with TFM finish depending on the exposure.
 - 2) Back shall be dadoed into sides, bottoms, and tops of closed cabinets.
 - b. Open Cabinets: 3/4-inch thick particleboard core with HPDL finish.
 - 1) Back shall be dowelled into sides, bottoms, and tops of open cabinets.
 - 4. Cabinet Bases (Fixed base and tall units:
 - a. Material: 3/4-inch, 45 pound density particle board.
 - b. Height: 4-inches, unless noted otherwise.
 - c. Base Options:
 - 1) Individual factory-applied base.
 - 2) Separate Cabinet Bases (Contractor Option): Bases to be continuous per elevation with cross members on 16-inch centers.
 - 5. Base units, except sink base units: Full sub-top glued and doweled to cabinet sides.
 - a. Sink base units are provided with open top and a stretcher at the front, attached to the sides. Back to be split removable access panel.

- 6. Adjustable Shelves in Cabinets:
 - a. All shelving shall be 1-inch thick particleboard core with HPDL finish.
 - b. All shelving shall be fully adjustable on 2-inch centers, with 5mm diameter holes.
 - c. Edgebanding: Refer to "Edgebanding" Article this Section.
- C. Door and Drawer Fronts:
 - 1. 3/4-inch particleboard core with HPDL finish.
 - a. Sink Cabinets: Core shall be Moisture-Resistant MDF (MR-MDF) with HPDL finish.
 - 2. Edgebanding: Refer to "Edgebanding" Article this Section.
- D. Drawers:
 - 1. Hardwood drawer bodies:
 - a. Drawer sides and back shall be 1/2-inch thick hardwood, fully dovetailed front, back and sides, with 1/4-inch thick tempered masonite bottoms.
 - b. Drawer bottom shall be 1/4-inch thick tempered masonite.
 - c. All exposed top, sides, bottoms and backs of wood and masonite to have factory finish of two (2) coats lacquer.
 - 2. CONTRACTOR OPTION: In lieu of hardwood drawers, provide steel drawer pans specified below:
 - a. Basis of Design Product: "Metabox", as manufactured by Blum, Inc. (P: 800-438-6788 / Web: www.blum.com)
 - b. Material / Finish: 0.0359-inch (0.9-mm-) thick metal, metallic phosphate treated, and finished with manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat and 2 mils (0.05 mm) for system.
 - c. Drawer Configuration: Standard drawer.
 - d. Drawer Heights:
 - 1) Type N: 2-1/8 inches (54 mm)
 - 2) Type M: 3-3/8 inches (86 mm)
 - 3) Type K: 4-5/8" inches (118 mm) Standard drawer height.
 - 4) Type H: 5-7/8 inches (150 mm)
 - e. Drawer Slide Operation: Self-Closing Action Drawer Slides (BLUMATIC) with full Extension Drawer Slides (330 Series).
 - f. Drawer Box Length: 21-5/8 inches.
 - g. Testing Standards: Meet or exceed ANSI/BHMA A156.9, Grade 1.
 - 1) Static load capacity: 100 lbs.
 - 2) Dynamic load capacity: 75 lbs.
 - 3) Test to perform 100,000 open/close cycles without failure.
- E. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

2.07 JOINERY OF CASE BODY MEMBERS

- A. Tops, exposed ends and bottoms:
 - 1. Stop dado, glued with pressure, and either nailed, stapled or screwed (fasteners will not be visible on exposed parts), or
 - 2. Doweled, glued with pressure; approx. 4 per foot, or
 - 3. European assembly screws:
 - a. Fasteners are to be used no more than 37mm from each end, with subsequent screws no more than 128-mm on-center.
 - b. Screw heads and/or plastic trim caps shall not be visible on exposed parts.
 - c. Glue is not required with this system.
- B. Cabinet Backs Wall-Mounted:
 - 1. Captured in grooves on cabinets sides and bottom; securely fastened.
- C. Cabinet backs Floor-Standing:
 - 1. Side bound, captured in grooves; securely fastened to top and bottom.

2.08 CABINET HARDWARE AND ACCESSORIES

- A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin finish, stainless steel, or powder-coated, commercial-quality, heavy-duty hardware.
- B. Hinges:
 - 1. Frameless Concealed Hinges (European Type): BHMA A156.9, Type B01602, 120-degrees or 165-degrees of opening, self-closing.
 - a. Quantity:
 - 1) Provide two hinges for doors up to and including 36-inches high.
 - 2) Provide three hinges for doors over 36-inches, up to and including 54-inches high.
 - 3) Provide four hinges for doors over 54-inches up to and including 72-inches high.
 - 4) Provide five hinges for doors over 72-inches high.
- C. Metal Drawer and Door Pulls:
 - 1. Specified Manufacturer: Doug Mockett & Company (P: 800-523-1269 / Web: www.mockett.com)
 - a. Other Acceptable Manufacturer/s: Equivalent products of the manufacturer's listed below will be acceptable.
 - 1) Amerock (P: 800-435-6959 / Web: www.amerock.com)
 - 2) Rok Hardware
 - 3) GlideRite Hardware (P: 909-591-7555 / Web: www.gliderite.com)
 - 4) Jako Hardware (P: 786-899-0950 / Web: www.jako.biz)
 - 2. General:
 - a. Provide two pulls for drawers more than 27-inches wide.
 - b. Provide 1-inch long mounting screws.
 - 3. Metal Drawer and Door Pulls:
 - a. Product: Mockett; Model No. DP55A Rod Pull:
 - 1) Finish: Satin Stainless Steel.
 - 2) Length: 6-5/16 inches.
 - 3) Center-to-Center Spacing: 3-3/4 inches.
 - 4) Bar Diameter: 7/16-inches, nom.
 - 5) Post Diameter: 5/16-inches.
 - 6) Projection: 1-3/8 inches, nom.
 - 7) Meets ADA guidelines.
- D. Door Catches:
 - 1. Base and Wall Cabinets: Self-aligning, permanent magnetic catches.
 - 2. Tall Cabinets: Nylon-roller spring catch.
 - a. Provide two catches on doors more than 48-inches high.
- E. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.
 - 1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
 - 2. Drawers: Provide one bumper on back side of drawer front at each corner.
- F. Shelf Supports:
 - 1. Adjustable Shelf Supports: Two-pin locking plastic shelf rests complying with BHMA A156.9, Type B04013.
- G. Drawer Slides: BHMA A156.9, Grade 1HD-100:
 - 1. Box Drawer Slides:
 - a. Regular, kneespace and pencil drawers: 100-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.
 - b. Paper storage drawers: 150-pound load rated epoxy coated steel slides.
 - 2. Letter/Legal File Drawer Slides: 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.

- 3. Lateral File Drawer Slides, 30-inches and wider: Full extension, 200-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop both directions with self-closing feature.
- 4. File Suspension System: Extruded molding integral with top of file drawer box sides to accept standard hanging file folders.
- H. Sliding Door Track: Anodized aluminum double channel.
- I. Coat Rods: 1 inch diameter, 14-gauge chrome plated steel installed in captive mounting hardware.
- J. Mirrors: 1/8 inch thick mirrored acrylic, break and impact resistant.

2.09 DRAWER AND DOOR LOCKS

- A. Manufacturer: Products from Olympus Lock, Inc are specified to establish a standard of quality for design, function, materials, and appearance.
 - 1. Equivalent products by other manufacturers may be acceptable if approved in accordance with Section 01 25 00.
- B. Deadbolt Locks:
 - 1. Products:
 - a. Drawers: Olympus; N Series, Model No. 200DW.
 - 1) Compliance: ANSI/BHMA No. E07041
 - 2) Barrel Length: 15/16-inch, 1-3/8 inch, or 1-5/8-inch.
 - 3) Angle Strike: Olympus #12-3.
 - 4) Finish: US26D.
 - b. Doors: Olympus; N Series, Model No. 100DR.
 - 1) Compliance: ANSI/BHMA No. E07121.
 - 2) Barrel Length: 15/16-inch or 1-3/8 inch.
 - 3) Bar Strike: Olympus #56-1.
 - 4) Finish: US26D.
 - 2. General Specifications:
 - a. Rekeyable Deadbolt Locks. All locks to include working cylinder slides and forwardly removable cylinders for rekeying without totally disassembling lock body.
 - b. Standard Function: Key removable in locked or unlocked position. Standard function locks are non-handed.
 - c. Keyways:
 - 1) Standard Keying: N Series, National D4291, 4-pin system
 - 2) Masterkeyed: N Series, National D4292, 5-pin system.
 - d. Spacers: Furnish cylinder spacers for flush fit with outside face of casework material.
 - e. All locks will provide functionality such that the keyway will remain in the vertical position regardless of installation as a door or drawer.
- C. Lock Locations:
 - 1. Provide locks on ALL tall storage cabinets and wardrobe cabinets, even if not shown on drawings.
 - 2. Provide locks on ALL file drawers.
 - 3. Provide locks on base cabinet doors and drawers as shown on drawings.
 - 4. Provide locks on wall cabinet doors as shown on drawings.
 - 5. Lock Keying:
 - a. Locks shall be capable of being keyed alike, keyed different and/or master keyed as directed by Owner.
 - b. Provide 2 keys per lock and 10 master keys.

2.10 UTILITY SHELVING

- A. Wall-Mounted, Adjustable, Utility Shelving:
 - 1. Shelves:
 - a. Thermally Fused Melamine Laminate (TFM) Panels, 1-inch thick, with 3 mm PVC edgebanding all edges.

- b. Maximum Length: 36-inches.
- c. Depth of Shelves: As indicated on drawings.
- 2. Shelf Standards
 - a. K&V No. 85-ANO-XX; 1.25-inches wide by 1/2-inch deep, double slot design, 1-inch vertical adjustment.
- 3. Shelf Brackets
 - a. K&V No. 185-ANO-XX; Depth as shown on drawings.
 - Shelf Rests:
 - a. K&V No. 106-ANO; or approved equal.

2.11 PLASTIC LAMINATE COUNTERTOPS

- A. Plastic Laminate Countertops: Shall be high-pressure decorative laminate (HPDL) sheet bonded to a core material.
- B. Core Materials:

4.

- 1. Particleboard: All countertops, unless indicated otherwise: 1-1/8 inch thick ANSI A208.1 M-2 particleboard.
 - a. Exception: Where countertops receive sinks, lavatories, or are subjected to liquids, provide 1-1/8 inch thick Moisture-Resistant MDF (MR-MDF) core.
- C. HPDL Overlay: NEMA LD 3, Grade HGS, 0.048-inch nominal thickness.
- D. Backing Sheet: Provide backing sheet (BKL) under narrow applied drop edge or return. Use of thermoset decorative overlay is not acceptable.
- E. Total Finished Countertop Thickness: 1 1/4-inches.
- F. Performance:
 - 1. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - 2. NSF approved for food contact.
 - 3. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
- G. Exposed Edge Treatment:
 - 1. Square, Self-Edge: Substrate built up to 1 1/4-inches thick; exposed faces covered with edgebanding. Refer to "Edgebanding" Article this Section.
 - a. Application of self-edge: Edge laminated befor top.
- H. Back and End Splashes: Same material, same construction.
 - 1. All other Countertops: Back and End Splashes shall be 3/4-inches thick and attached by means of screws from underside of deck through continuous bead of silicone sealant.
 - a. Exposed edges and ends of backsplash shall be covered with edgebanding. Refer to "Edgebanding" Article this Section.
 - 2. Backsplashes in wet areas shall be moisture-resistant MDF (Medex) with high-pressure laminate bonded to all faces, including BKL on the back.
- I. Countertop Accessories:
 - 1. Wall-Mounted Countertop Support Brackets: Provide metal wall bracket, 1/8-inch thick, with black powder coat finish for support of countertops as shown on the Drawings.
 - a. Basis of Design Manufacturer: A&M Hardware (P: 888-647-0200 / Web: www.AandMHardware.com).
 - b. Size: Sized to correspond to countertop depth.
 - c. Provide fire treated solid wood blocking to support and secure brackets when installed at metal stud walls.
 - d. Load capacity shall be 1000 lbs per bracket, minimum.
 - 2. Grommets for Cable Passage through Countertops: 2-1/2 inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - a. Product: Subject to compliance with requirements, provide "EDP series" by Doug Mockett & Company, Inc., or approved equal.
 - b. Color: Black.

2.12 PLASTIC LAMINATE MATERIALS

A. Manufacturer:

1.

- Specified Manufacturer/s: Formica and Wilsonart.
 - a. Other Acceptable Manufacturer: None identified. No substitutions will be considered or accepted.
- B. Laminate Properties:
 - 1. Laminate Composition: Decorative surface papers impregnated with melamine resins and pressed over kraft paper core sheets impregnated with phenolic resin. Sheets then bonded together under high pressure and high temperatures. Finished sheets trimmed and backs sanded to facilitate bonding to substrate.
 - 2. Surface Burning Characteristics:
 - a. Test Standards: ASTM E 84, ASTM E 162, ASTM E 662, IMO FTP Code Part 2 and Part 5, and UL 723.
 - b. Interior Finish Classification, Fire-Rated Laminate: Class A according to NFPA 101.
 - c. Flame Spread Index: Less than 25; Smoke Developed Index: Less than 450.
 - 3. Surfaces Subject to Food Contact: Comply with NSF Standard 35.
 - 4. Grades: Refer to "Materials" Article this Section.
- C. Plastic Laminate, scheduled on the Drawings as Finish Type PLAM- #.
 - 1. Refer to the "Interior Finish Legend" (Sheet A4.2) for pertinent information on the plastic laminate materials scheduled.

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 the Work.

3.02 PREPARATION:

A. Condition casework to average prevailing humidity conditions in installation areas prior to installing.

3.03 INSTALLATION

- A. Separate Cabinet Bases: At the contractor's option, install separate cabinet bases prior to remaining casework as required to coordinate with installation of flooring and base.
- B. Provide and install scribe strips to adjoining walls, accurately fitted, installed with fastenings.
- C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- D. Wall Cabinets: Hang wall cabinets straight, level, and plumb. Adjust fronts and bottoms to align in a single plane or straight line. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions to provide positive anchorage. Align similar adjoining doors to align in a straight line.
- E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
- F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- G. Repair or remove and replace defective work as directed on completion of installation.
- H. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.04 CLEANING:

- A. Remove and dispose of all packing materials and related construction debris.
- B. Clean cabinets inside and out. Wipe off fingerprints, pencil marks, and surface soil etc., in preparation for final cleaning by the building owner.

3.05 PROTECTION

- A. Protect completed work from damage during remainder of construction period.
- B. DO NOT stand on the installed countertops for any reason.

END OF SECTION

SECTION 13 49 13

INTEGRATED X-RAY SHIELDING ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lead sheet applied to gypsum board.
- B. X-ray treatment room view window frames and door frames.
- C. Leaded glass.

1.02 RELATED SECTIONS

- A. Section 08 14 16 Flush Wood Veneer Doors
- B. Section 08 12 13 Hollow Metal Frames for Wood Doors
- C. Section 09 21 16 Gypsum Board Assemblies
- D. Section 09 91 23 Interior Painting.

1.03 REFERENCE STANDARDS

- A. ASTM B749 Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products; 2014.
- B. ASTM C1036 Standard Specification for Flat Glass; 2016.
- C. ASTM C1396/C1396M Standard Specification for Gypsum Board; 2014a.
- D. NCRP Report 147 Structural Shielding Design and Evaluation for Medical Uses of X Rays and Gamma Rays of Energies up to 10 MeV; 2004.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Provide materials and workmanship, including joints and fasteners, that maintain continuity of radiation protection at all points and all directions equivalent to materials specified in thicknesses and locations indicated.
 - a. Employ physicist knowledgeable in radiation protection for medical facilities to determine thicknesses and configurations of lead-lined materials.
 - 2. Lead-Lined Assemblies: Provide lead thickness in doors, door frames, window frames, and other items located in lead-lined assemblies, not less than that indicated for assemblies in which they are installed unless indicated otherwise.
 - 3. Lead Glazing: Provide lead equivalence not less than that indicated for assembly in which glazing is installed unless indicated otherwise.
- B. Protection:
 - 1. Walls, including wall interruptions for doors, glazing, and thresholds.
 - 2. Ceilings.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate this work with the construction of the building elements that x-ray protection is applied to or installed in.

1.06 SUBMITTALS

- A. Submit in accordance with Section 01 33 00 Submittal Procedures
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings:
 - 1. Indicate dimensions, description of materials and finishes and general construction.
 - 2. Indicate layout of radiation-protected areas.
 - 3. Indicate lead thickness or lead equivalencies of components.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with NCRP Report 147.1. Maintain one copy of document on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five (5) years experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience and approved by manufacturer.
- D. Radiation Protection Survey: Employ registered X-Ray physicist, certified by American Board of Radiology, for testing specified radiation protective Work and to conduct radiation protection survey of facility after radiation shielding materials are installed.
 - 1. Take radiation measurements and indicate evaluation of measurements in report. Submit report to Architect and Owner upon completion of report.
- E. Single Source Responsibility: Obtain radiation protection materials and accessories produced as standard products from single manufacturer regularly engaged in production of X-Ray shielding materials, equipment, and accessories.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's instruction for receiving, handling, storing, and protecting materials.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store materials in original packaging, protected from exposure to harmful environmental conditions, including static electricity, and at temperature and humidity conditions recommended by manufacturer.
- D. Exercise care to prevent edge damaged materials.

1.09 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.10 WARRANTY

A. Provide manufacturer's standard limited warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specified Manufacturer: Radiation Protection Products, Inc.
 - 1. Contacts: P: 888-746-4777 / Email: customerservice@rppinc.com / Web: www.radiationproducts.com.
- B. Other Acceptable Manufacturer: Equivalent products of the manufacturer's listed below will be acceptable.
 - 1. Ultraray Group (P: 877-405-1542 / Website: www.ultraray.com)
 - 2. Nuclead: (P: 508-583-2699 / Website: www.nuclead.com)
 - 3. Mayco Industries, Inc . (P: 844-334-5395 / Website: www.maycoindustries.com)
 - 4. Ray-Bar Engineering Corp oration (P: 800-444-9729 / Website: www.raybar.com)

2.02 LEAD SHEET AND ASSOCIATED MATERIALS

- A. Lead Sheets: 99.9 percent pure unpierced virgin lead, free from dross, oxide inclusions, scale, laminations, blisters, and cracks.
 - 1. Sheet Lead shall meet or exceed the Federal Specification QQL-201 F Grade C and ASTM B749, see NCRP Report 147.
 - 2. Thickness: As determined by Radiation Protection Survey, or not less than 1/16 inch (1.5 mm) if not indicated.
 - 3. Variation in sheet thickness: Not to exceed 3 percent.
- B. Lead Plates: 99.9 percent pure unpierced virgin lead, free from dross, oxide inclusions, scale, laminations, blisters, and cracks.
 - 1. Lead plate shall meet or exceed the Federal Specification QQL-201 F Grade C and ASTM B749, see NCRP Report 147.
 - 2. Thickness: As determined by Radiation Protection Survey, or not less than 1/16 inch (1.5 mm) if not indicated.
 - 3. Variation in sheet thickness: Not to exceed 3 percent.
- C. Gypsum Board: Refer to Section 09 21 16 Gypsum Board Assemblies.

2.03 LEAD-BACKED GYPSUM BOARD

- A. Lead-backed Gypsum Board: Single unpierced layer of sheet lead complying with ASTM B749, laminated to the back of gypsum board panels.
 - 1. Sheet Lead:
 - a. Lead Thickness: 1/16 inch (1.5 mm), minimum.
 - b. Lead Weight: 1.0 lb (0.45 kg), minimum.

2.04 LEAD-LINED WOOD DOORS, NON-RATED

- A. General Construction: WDMA Industry Standard I.S. 1A-04, S-9 Veneer, Particleboard Core Bonded, Premium Grade Door.
 - 1. WDMA Specification Description: "PC-5".
 - 2. Door thickness: 1-3/4 inches, unless indicated otherwise.
- B. Edge Strips: Minimum thickness of 2 inches (51 mm) each edges of door.
 - 1. Species same as wood face veneer.
 - 2. Glue strips to cores before face veneer is applied.
 - 3. Extend vertical edge strips full height of door and bevel 1/8 inch (3 mm) for each 2 inches (51 mm) of door thickness.
- C. Face Veneers: Match Door Facings specified in Section 08 14 16 Flush Wood Veneer Doors.
- D. Core construction:
 - 1. Material: Particleboard complying with ANSI A208.1 Type 1, Grade 1-LD-2 with Formaldehyde emissions limited to 0.30 ppm.
 - 2. Provide divided core secured by lead covered bolts.
 - 3. Lead sheets: located in door center, extended to outer edges of door.
 - 4. Stiles: Laminated strand lumber or hardwood mill option for inner ply of styles, with outer ply matching face veneer, or visually compatible hardwood species.
 - 5. Provide divided stiles secured by lead covered bolts.
 - 6. Top and bottom rails: Provide divided rails secured by lead covered bolts.
 - 7. Top and bottom rails with wood veneered faced doors: Maple or Birch, as standard with manufacturer.
- E. Door Size: As indicated on drawings.
- F. Adhesives: Type 1 (waterproof) for both face and core assembly.

2.05 LEAD-LINED HOLLOW METAL FRAMES

- A. Lead-lined hollow metal frames for doors and borrowed lites; Non-rated and fire-rated.
 - 1. Refer to Section Section 08 11 13 Hollow Metal Doors and Frames for general requirements.
 - 2. Frames shall be Full profile/continuously welded type.
 - 3. Frames shall be provided with clips only for the lead lining.
 - a. Lead lining clips are located on the door side of frame. Lead is to cover the inside surfaces of the face, rabbet, stop and part or all of the soffit. Lead linings are to be overlapped at the mitters of the frame.
 - 4. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
 - a. Provide angle iron spot welded at 6 inches (152 mm) on center, and anchor bolts to secure frame if lead thickness is 1/8 inch (3 mm) or greater.

b. Design lead-lined door frames to accommodate lead lining up to 1/2 inch (13 mm) thick.

2.06 RADIATION SHIELDING X-RAY SAFETY GLASS

- A. Product: Glazing Type GL-5, as specified in Section 08 80 00.
 - 1. Description: Lead glass laminated to clear float glass to comply with applicable building codes for safety glass.

2.07 DOOR HARDWARE

- A. Hardware: Specified in Section 08 71 00 Door Hardware
- B. Threshold: Formed lead, channel shape, to receive grout fill, 6-inches wide by width of door opening plus 4 inches to fit under frame section (plus 100 mm to fit under frame section).

2.08 FABRICATION

- A. Lead-backed Gypsum Board: Fabricate with monolithic sheet lead bonded to one surface of board, extend lead sheet 1 inch (25 mm) beyond one side and one end of board.
- B. Lead Sheet:
 - 1. General Sustainability Requirements: Use maximum available percentage of recycled materials but not less than that required to meet LEED[™] NC, Version 2.2 Credit MR 5.2
 - 2. Lead sheet: Conforming to ASTM B 29 in uniform thickness(es) as required by Physicist of Record report(s).

2.09 COMPONENTS AND ACCESSORIES

A. Leaded Glass: ASTM C1036, clear, lead content equivalent to protection requirements of this section.

2.10 FINISHES

A. Field-Painted Surfaces: As specified in Section 09 91 23.
 1. Color: As scheduled on "Room Finish Schedule" on Sheet A4.2.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing surfaces are ready to receive work and opening dimensions are as indicated on shop drawings.

3.02 INSTALLATION: LEAD-BACKED DRYWALL AT WALLS

- A. Installation shall be by the contractor specifically per manufacturer's recommendations, MSDS and instructions and in strict compliance with NCRP, the radiation physicist shielding report, safety codes,OSHA, building codes and proper U.L Partition designs where applicable.
- B. Lead backed drywall must be installed vertically with long edges parallel to supports.
- C. Studs must be a minimum of 20-gauge and set a maximum of 16-inches on-center for vertical installation of lead backed drywall.
- D. Adhere lead strips on face of studs at joints in lead-backed gypsum board, including inside and outside corners. Use 2 inches (50 mm) wide strips by same thickness as sheet lead laminated on gypsum board.
- E. Screw Shielding: Supply 3/8" diameter lead discs of the same lead thickness to be installed over each of the fasteners with a fast-drying construction adhesive.
- F. Secure gypsum board to supports with fasteners spaced as recommended by board manufacturer.
 - 1. All penetrations in leadlined walls must be properly backed with sheet lead of same thickness as on surrounding wall with proper overlaps as required.
 - 2. Where outlet boxes, junction boxes, ducts, conduit and similar items prevent the use of shields, provide lead sleeves or lead lining or backing as required with proper overlaps. Provide lead lining, sleeves, shields and other protections of equivalent thickness of lead as used in the wall partition shielding system that each penetration occurs in.

- 3. No other trades or persons to occupy room or work area during lead installation.
- G. All lead trimmings must be recycled or disposed of in compliance with applicable health, safety and environmental codes and regulations. Properly and completely clean up and disposal or recycle all sheet lead trimmings and debris.
 - 1. Never dispose of any lead or lead containing materials in general trash or refuse.

3.03 INSTALLATION: LEAD-LINED HOLLOW METAL FRAMES

- A. Install lead-lined hollow metal door and/or borrowed lite frames in compliance with NAAMM HMMA 840 unless otherwise indicated. Set frames accurately in position, plumb, and braced securely until permanent anchors are set.
 - 1. Lead Lining of Frames:
 - a. Line inside of frames with lead of thickness not less than that required in doors and walls in which frames are used.
 - b. Form lead to match frame contour, continuous in each jamb and across head, lapping stops.
 - c. Line covers, escutcheons, and plates to provide effective shielding at cutouts and penetrations of frame.
 - d. Form lead shields around areas prepared to receive hardware.
 - e. Lap lining over lining in walls at least 1 inch (25 mm).
 - 2. Secure door frames with steel stud anchors if lead lining is below 1/8 inch (3 mm) thick.
 - 3. Door Frame Supports (utilize if lead thickness is 1/8 inch (3 mm) or greater):
 - a. Run steel angle supports full height on each door frame jamb to structure above.
 - b. Spot-weld supports at 6 inches (152 mm) along jambs and at corners of jambs and head frame.
 - c. Anchor frame to substrate with fasteners appropriate for substrate.
- B. Provide 3 anchors per jamb, located adjacent to hinge on hinge jamb, and at corresponding heights on strike jamb.
- C. In metal stud construction, use wall anchors attached to studs with screws.
- D. Touch up damaged finishes with compatible coating after sanding smooth.

3.04 INSTALLATION: LEAD-LINED WOOD DOORS

- A. Install lead-lined wood doors per manufacturer's installation instructions. Reference Section 08 14 16 - Flush Wood Veneer Doors for similar requirements.
- B. Install doors in frames level and plumb, aligned with frames and with uniform clearance at edges.
- C. Line covers, escutcheons, and plates to provide effective shielding at cutouts and penetrations of doors. Refer to the Door Hardware Section for other installations requirements.

3.05 INSTALLATION: LEAD-LINED WINDOW FRAMES

- A. Set unleaded side of frame plumb and square in wall opening on control room side of wall with shims.
- B. Set leaded side of frame plumb and square in wall opening on X-Ray side of wall.
- C. Install radiation resistant glazing in window frame.
- D. Install glazing stops.

3.06 INSTALLATION: LEAD SHIELDING AT PENETRATING ITEMS

- A. At penetrations of lead linings; provide lead shields to maintain continuity of protection.
- B. Provide lead linings, sleeves, shields, and other protection in thickness not less than that required in assembly being penetrated.
- C. Cut wall penetration covers from lead sheet of equal or greater thickness than backing on adjacent wall panels. Cut wall penetration covers to size required to cover wall penetrations with laps 1 inch (25 mm) minimum wide as indicated on penetration detail drawings.

- D. Adhesive-apply lead sheet penetration covers on penetrating boxes and raceways and return penetration covers to backside of lead-backed wall panels with 1 inch (25 mm) minimum laps.
 1. Do not use penetrating fasteners unless indicated otherwise.
- E. Install outlet boxes and conduit between studs using steel telescoping mounting brackets. Cover or line with lead sheet lapped over adjacent lead lining at least 1 inch (25 mm). Wrap conduit with lead sheet for 10 inches (250 mm) in from box.

3.07 INSTALLATION: WALL PENETRATION COVERS

- A. Duct Penetrations With 8 PSF or Less Lead Sheet:
 - 1. Wrap ducts with wall penetration covers, lapping lead joints 1 inch (25 mm) minimum.
 - 2. Secure lead sheet in place with 1 inch (25 mm) minimum width steel bands spaced not more than 12 inches (305 mm) on center.
 - 3. Do not cut into lead sheet with tightening steel bands.
- B. Duct Penetrations with Greater than 8 psf Lead Sheet and Where Duct Shielding Exceeds 24 Inches (610 mm) in Width:
 - 1. Laminate wall penetration covers to plywood or other similar structural panels conforming to shape of duct, lapping lead joints 1 inch (25 mm) minimum.
 - 2. Secure lead laminated panels to ducts with mechanical fasteners located at duct seams and corners.
 - 3. Where necessary to prevent lead laminated panels from overloading duct supports, independently suspend panels from hangers secured to overhead building structure.
 - 4. Cover fastener heads with lead sheet matching thickness of adjacent lead.
- C. Piping: Unless indicated otherwise, wrap piping with lead sheet for 10 inches (250 mm) from point of penetration.

3.08 ACCESSORY INSTALLATION

- A. Comply with manufacturer's recommendations.
- B. Wherever lead protection is penetrated, cut, or punctured, assure continuity of shielding by use of sheet lead, lead plugs or other approved method.
- C. Install sheet lead lining within steel door frames to provide radiation protection to levels indicated or levels required to match adjacent wall protection.
- D. Wrap electrical outlet boxes, view window frames, and other penetrations through lead barrier material with sheet lead to provide radiation protection to levels indicated or levels required to match adjacent wall protection.

3.09 INSPECTION

- A. Field Inspection: Owner will engage qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - 1. Inspection will be performed by a licensed radiologist technician in coordination with regulatory agency requirements, to ascertain compliance of installation regarding radiation passage or leakage.
- B. Correct deficiencies in, or remove and replace, radiation protection that inspection reports indicate does not comply with specified requirements.

3.10 CERTIFICATION

A. Upon completion of X-ray Shielding, Manufacturer and Fabricator-Installer shall furnish a certificate of compliance stating that all materials are in accordance with this specification and the physicist shielding report.

3.11 TESTING

A. After the X-Ray equipment has been installed and placed in operating condition or with a similar adjustable radiation source, prior to occupancy and use, the radiation shielding will be tested by the original calculating project health radiation physicist of record at Owners expense.

B. Correct deficiencies in, or remove and replace, radiation protection that testing indicates does not comply with specified requirements, including finishes and other Work covering defective Work.

3.12 CLEANING

- A. Remove excess materials from site and leave Work areas broom clean.
- B. Leave exposed surfaces ready for site finishing.

3.13 PROTECTION

- A. Lock radiation-protected rooms once doors hardware is installed. Limit access to only those persons performing Work in radiation-protected rooms or as directed by Owner.
- B. Tape temporary paper signs on radiation-resistant walls with the following text:
 - 1. "Do not mount equipment on this wall without covering penetrating fasteners with lead sheet of thickness required by contract documents".

END OF SECTION