



**INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING**
Northshore School District No. 417

PROJECT MANUAL – VOLUME 2 of 3

April 13, 2020

PROJECT MANUAL

For

**Inglemoor High School
Concert Hall + Music Building**

Northshore School District
3330 Monte Villa Parkway
Bothell, WA 98021

DATE: April 13, 2020

Owner

| | | | |
|----------------------------|--|----------------|--------|
| Northshore School District | Dr. Michelle Reid, Superintendent Dr. Joe Paperman, Chief Operating Officer Dugan Harman, Deputy Superintendent 3330 Monte Villa Parkway Bothell, WA 98021 | (425) 408-7701 | office |
|----------------------------|--|----------------|--------|

Capital Projects

| | | | |
|--|--|----------------------------------|----------------|
| Dri Ralph Planning & Design Administrator dralph@nsd.org | Northshore School District Capital Projects 22105 23 rd Drive SE Bothell, WA 98021 | (425) 408-7864 (206) 462-9664 | office cell |
|--|--|----------------------------------|----------------|

Architect

| | | | |
|---|---|----------------------------------|----------------|
| Kevin Oremus Principal in Charge koremus@hoarch.com | Hutteball & Oremus Architecture, Inc. 4010 Lake Washington Blvd. NE, Suite 320 Kirkland, WA 98033 | (425) 828-8948 (206) 409-5344 | office cell |
| Aaron MacDonald amacdonald@hoarch.com | | | |
| Marissa Rutler mrutler@hoarch.com | | | |

Civil Engineering

| | | | |
|---|--|----------------------------------|----------------|
| Joe Moon Principal jmoon@integworks.com | Integrity Works Consulting Engineers 170 West Dayton Street, Suite 204 Edmonds, WA 98020 | (425) 967-7913 (206) 920-9410 | office cell |
|---|--|----------------------------------|----------------|

Landscape Architecture

| | | | |
|---|---|----------------|--------|
| Nick Hagan Principal nick@wdginc.com | Weisman Design Group, Inc 2329 E Madison Street Seattle, WA 98112 | (206) 322-1732 | office |
| Callie Roberts Callie@wdginc.com | | | |

Structural Engineering

Cory Hitzemann
Structural Associate Principal
coryh@cplinc.com

Coughlin Porter Lundeen
801 2nd Ave, Suite 900
Seattle, WA 98104

(206) 343-0460 office

Christen Sanders
Structural Project Engineer
christens@cplinc.com

Mechanical Engineering

Brian Haugk
Principal, Mechanical
brianh@hargis.biz

Hargis Engineers
1201 3rd Ave, Suite 600
Seattle, WA 98101

(206) 436-0405 office
(206) 355-4236 cell

Electrical Engineering

Mike Fitzmaurice
Principal, Electrical
mike@tf-wb.com

Travis Fitzmaurice Wartelle Balangue
Engineers Inc.
1200 Westlake Ave. N., Suite 509
Seattle, WA 98109

(206) 285-7228 office
(206) 300-6913 Cell

Aprille Balangue
Principal, Electrical
arpille@tf-wb.com

(206) 413-3501 office
(206) 285-7228 cell

Estimating Consultant

Dan Cassidy
Chief Estimator
dcassidy@us.rlb.com

RLB | Robinson
101 Stewart Street, Suite 925
Seattle, WA 98101

(206) 441-8872 office

Acoustical/Audiovisual

Dan Bruck
President
danb@brcacoustics.com

BRC Acoustics & Audiovisual Design
1932 First Ave, Suite 620
Seattle, WA 98101

(206) 270-8910 office

John Hardwick
jhardwick@brcacoustics.com

(206) 714-4003 cell

Theater Lighting Consultant

| | | | |
|--|--|----------------|--------|
| Robert Smulling Senior Theater Consultant robert@pladesigns.com | PLA Designs 4914 55 th Avenue South Seattle, WA 98118 | (206) 257-2251 | office |
|--|--|----------------|--------|

Weatherization Consultant

| | | | |
|--|---|----------------|--------|
| Chad Smith Principal Engineer chad@bee-engineers.com | Building Envelope Engineering 170 W. Dayton Street, Suite 206 Edmonds, WA 98020 | (425) 672-3900 | office |
|--|---|----------------|--------|

Owner's Surveyor

| | | | |
|---|---|----------------|--------|
| Rink Carpenter Director of Surveying rinkc@harmsseninc.com | Harmesen & Associates, Inc. 16778 146 th Street SE, Suite 104 Monroe, WA 98272 | (360) 794-7811 | office |
|---|---|----------------|--------|

Owner's Land Use Planning Consultant

| | | | |
|---|---|----------------|--------|
| Laura Brent lbrent@brentplanningsolutions.com | Brent Planning Solutions PO Box 1586 Mukilteo, WA 98275 | (425) 971-6409 | office |
|---|---|----------------|--------|

Owner's Environmental Consultant

| | | | |
|--|--|----------------|--------|
| Meryl Kamowski Senior Ecologist meryl@wetlandresources.com | Wetland Resources 9505 19 th Ave. SE, Suite 106 Everett, WA 98206 | (425) 337-3174 | office |
|--|--|----------------|--------|

Owner's Geotech Consultant

| | | | |
|---|--|----------------------------------|----------------|
| Kurt Merriman Senior Principal kmerriman@aesgeo.com | Associated Earth Sciences, Inc 911 Fifth Ave, Suite 110 Kirkland, WA 98033 | (425) 827-7701 (425) 766-7065 | office cell |
| Bruce Guenzler bruceg@aesgeo.com | | | |

Owner's Traffic Consultant

| | | | |
|--|--|----------------------------------|----------------|
| Jennifer Barnes Associate Principal jennifer@hefftrans.com | Heffron Transportation 6544 NE 61 st St Seattle, WA 98115 | (206) 523-3939 (206) 324-3623 | office cell |
|--|--|----------------------------------|----------------|

Owner's Commissioning Agent

Scott Henderson
ScottHe@McKinstry.com

McKinstry
5005 Third Avenue South
Seattle, WA 98134

(206) 762-3311 office

Clint Hawn
Project Director, Energy

(713) 412-6827 office

VOLUME I

INTRODUCTORY INFORMATION

Pages

| | |
|------------------------|---|
| Frontispiece | 1 |
| Project Team..... | 4 |
| Table of Contents..... | 7 |

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

| | | |
|--------|--|----|
| 001115 | List of Documents | 1 |
| 001116 | Invitation to Bidders | 3 |
| 002113 | Instructions to Bidders | 7 |
| 002205 | GCCM Process | 15 |
| 002207 | Safety | 2 |
| 002410 | General Scope of Work..... | 10 |
| | Attachment: IHSCH Site Logistics Plans | 4 |
| 002413 | Specific Scope of Work (by bid package) | 49 |
| | Attachment: Bid Package Specification Matrix | 3 |
| 003113 | Schedule | 2 |
| | Attachment: Milestone Schedules..... | 2 |
| 004113 | Bid Form..... | 5 |
| 004322 | Schedule of Unit Prices..... | 2 |
| 004323 | Schedule of Bid Items | 1 |
| 005213 | Form of Contract | 1 |
| | Attachment: Standard Subcontract Agreement | 22 |
| 007200 | General Conditions | 1 |
| | Attachment: General Conditions of the Contract for Construction..... | 71 |

DIVISION 01 – GENERAL REQUIREMENTS

| | | |
|--------|---|----|
| 012200 | Unit Prices | 3 |
| 012300 | Alternates | 2 |
| 012500 | Substitution Procedures..... | 5 |
| | Substitution Request Form | |
| 012600 | Contract Modification Procedures..... | 5 |
| 012602 | Request for Information Form | 2 |
| 012900 | Payment Procedures | 5 |
| 012973 | Schedule of Values | 5 |
| 013100 | Project Management & Coordination..... | 5 |
| 013119 | Project Meetings | 4 |
| 013200 | Construction Progress Documentation | 2 |
| 013216 | Construction Progress Schedule | 5 |
| 013233 | Photographic Documentation | 2 |
| 013300 | Submittal Procedures..... | 9 |
| 013553 | Security Procedures..... | 2 |
| 014200 | References..... | 14 |
| 014216 | Definitions | 4 |
| 014300 | Quality Assurance | 5 |

| | | |
|--------|--|----|
| 014500 | Quality Control | 4 |
| 014523 | Testing and Inspection Services | 9 |
| 015000 | Temporary Facilities and Controls | 15 |
| 015600 | Temporary Barriers and Enclosures | 3 |
| 015639 | Temporary Tree Protection | 4 |
| 015700 | Temporary Controls | 5 |
| 015713 | Temporary Erosion and Sedimentation Control | 9 |
| 015721 | Temporary Indoor and Quality Control | 5 |
| 015813 | Temporary Project Signage | 3 |
| 016000 | Product Requirements | 4 |
| 016400 | Owner Furnished Products | 2 |
| 016510 | Delivery, Storage, and Handling Requirements | 3 |
| 017123 | Field Engineering | 4 |
| 017229 | Cutting and Patching..... | 8 |
| 017419 | Construction Waste Management and Disposal | 6 |
| 017423 | Final Cleaning | 4 |
| 017700 | Closeout Procedures | 5 |
| 017823 | Operation & Maintenance Data | 8 |
| 017836 | Warranties..... | 5 |
| 017839 | Project Record Documents | 5 |
| 017900 | Demonstration and Training..... | 3 |
| 018100 | Sustainable Design Requirements – WSSP..... | 9 |
| | <i>Protocol Scorecard</i> | 4 |
| 019100 | General Commissioning Requirements | 22 |

VOLUME II

INTRODUCTORY INFORMATION

Pages

| | |
|------------------------|---|
| Frontispiece | 1 |
| Project Team..... | 4 |
| Table of Contents..... | 7 |

DIVISION 02 – EXISTING CONDITIONS

| | | |
|--------|------------------------------------|---|
| 024119 | Selective Demolition | 6 |
| 026000 | Contaminated Soil Management | 7 |
| | <i>Soil Removal Plan</i> | 1 |

DIVISION 03 – CONCRETE

| | | |
|--------|--------------------------------------|----|
| 033000 | Cast-In-Place Concrete..... | 29 |
| 033543 | Special Concrete Floor Finishes..... | 6 |
| 034500 | Precast Architectural Concrete | 9 |

DIVISION 04 – MASONRY

Not Used

DIVISION 05 – METALS

| | | |
|--------|--|----|
| 051200 | Structural Steel Framing | 12 |
| 051213 | Architecturally Exposed Structural Steel Framing | 5 |
| 052100 | Steel Joist Framing | 6 |
| 053100 | Steel Decking | 7 |
| 054000 | Cold-Formed Metal Framing | 9 |
| 055000 | Metal Fabrications | 14 |

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

| | | |
|--------|--|---|
| 061000 | Rough Carpentry | 7 |
| 061600 | Sheathing | 4 |
| 062023 | Interior Finish Carpentry | 6 |
| 064219 | Plastic-Laminate-Faced Wood Paneling | 5 |

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

| | | |
|--------|--|----|
| 071113 | Bituminous Dampproofing | 3 |
| 071700 | Bentonite Waterproofing | 5 |
| 071900 | Water Repellents | 4 |
| 072100 | Thermal Insulation | 7 |
| 072500 | Weather Barriers | 7 |
| 074213 | Metal Wall Panels | 13 |
| 074214 | Metal Composite Material Wall Panels | 8 |
| 074633 | Composite Resin Panels | 7 |
| 074646 | Fiber-Cement Siding | 3 |
| 075419 | Single-Ply Membrane Roofing | 15 |
| 076200 | Sheet Metal Flashing and Trim | 13 |
| 078413 | Penetration Firestopping | 11 |
| 079200 | Joint Sealants | 13 |
| 079500 | Expansion Control | 4 |

DIVISION 08 – OPENINGS

| | | |
|--------|---|----|
| 081113 | Hollow Metal Doors and Frames | 10 |
| 081114 | Custom Hollow Metal Doors and Frames | 3 |
| 081416 | Flush Wood Doors | 6 |
| 083113 | Access Doors and Frames | 5 |
| 083473 | Sound Control Door Assemblies | 7 |
| 084113 | Aluminum-Framed Entrances and Storefronts | 12 |
| 084413 | Glazed Aluminum Curtain Walls | 15 |
| 085113 | Aluminum Windows | 6 |
| 087100 | Door Hardware | 25 |
| 087113 | Automatic Door Operators | 6 |
| 088000 | Glazing | 14 |
| 089119 | Fixed Louvers | 7 |

DIVISION 09 – FINISHES

| | | |
|--------|------------------------------------|----|
| 092118 | Acoustical Wall Construction | 4 |
| 092216 | Non-Structural Metal Framing | 8 |
| 092900 | Gypsum Board | 8 |
| 093013 | Ceramic Tiling | 10 |

| | | |
|--------|--|----|
| 095113 | Acoustical Panel Ceilings..... | 9 |
| 095426 | Suspended Wood Ceilings..... | 6 |
| 096513 | Resilient Base and Accessories | 5 |
| 096519 | Resilient Tile Flooring | 5 |
| 096551 | Performing Arts Specialty Floors | 6 |
| 096816 | Sheet Carpeting | 8 |
| 097200 | Wall Coverings..... | 5 |
| 097700 | Sanitary Wall Panels..... | 3 |
| 098400 | One-Dimensional Diffuser..... | 5 |
| 098433 | Acoustical Wall Panels..... | 6 |
| 099113 | Exterior Painting..... | 10 |
| 099123 | Interior Painting..... | 12 |

DIVISION 10 – SPECIALTIES

| | | |
|--------|-----------------------------------|---|
| 101100 | Visual Display Units | 6 |
| 101200 | Display Case..... | 5 |
| 101423 | Signage..... | 8 |
| 102113 | Toilet Compartments..... | 5 |
| 102123 | Cubical Curtains and Track..... | 4 |
| 102613 | Corner Guards | 4 |
| 102800 | Toilet and Bath Accessories | 5 |
| 104413 | Fire Protection Cabinets | 5 |
| 109000 | Miscellaneous Specialties..... | 2 |

DIVISION 11 – EQUIPMENT

| | | |
|--------|---|---|
| 116171 | Production Lighting Fixtures – Theatre (PLA)..... | 5 |
| 116623 | Gymnasium Equipment..... | 3 |

DIVISION 12 – FURNISHINGS

| | | |
|--------|-----------------------------------|----|
| 122113 | Horizontal Louver Blinds | 5 |
| 122413 | Roller Window Shades..... | 10 |
| 123550 | Casework | 12 |
| 126113 | Fixed Audience Seating (PLA)..... | 11 |

DIVISION 13 – SPECIAL CONSTRUCTION

Not Used

DIVISION 14 – CONVEYING EQUIPMENT

| | | |
|--------|---------------------------|----|
| 142400 | Hydraulic Elevators | 10 |
|--------|---------------------------|----|

VOLUME III

INTRODUCTORY INFORMATION

| | <u>Pages</u> |
|--------------------|--------------|
| Frontispiece | 1 |
| Project Team..... | 4 |

| | |
|-------------------------|---|
| Table of Contents | 7 |
|-------------------------|---|

DIVISION 21 – FIRE SUPPRESSION

| | | |
|--------|--|----|
| 210000 | Fire Suppression Work Specified in Division 23 | 1 |
| 211000 | Automatic Fire Suppression Systems | 14 |

DIVISION 22 – PLUMBING

| | | |
|--------|---|----|
| 220000 | Plumbing Work Specified in Division 23 | 1 |
| 220800 | Commissioning of Plumbing Systems | 3 |
| 221116 | Domestic Water System | 12 |
| 221120 | Plumbing Valves | 8 |
| 221123 | Plumbing Pumps | 3 |
| 221300 | Soil, Waste, Vent, and Storm Drain Piping Systems | 9 |
| 223000 | Plumbing Equipment | 5 |
| 224000 | Plumbing Fixtures | 11 |

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

| | | |
|--------|--|----|
| 230500 | General Provisions | 15 |
| 230505 | Project Closeout and System Start-Up | 4 |
| 230510 | Basic Materials and Methods | 15 |
| 230512 | Indoor Air Quality - HVAC | 3 |
| 230513 | Electrical Provisions for Mechanical Work | 5 |
| 230533 | Electrical Heat Trace | 3 |
| 230548 | Vibration Isolation | 12 |
| 230550 | Seismic Control | 6 |
| 230593 | Testing, Adjusting, and Balancing | 9 |
| 230700 | Mechanical Insulation | 14 |
| 230800 | Commissioning of HVAC Systems | 4 |
| 230810 | Section Systems Training | 6 |
| 230820 | Systems Operations and Maintenance Manuals | 5 |
| 230900 | Automatic Temperature Controls | 43 |
| 230915 | Variable Frequency Drives | 7 |
| 232113 | Hydronic Piping Systems | 15 |
| 232116 | Piping Specialties | 11 |
| 232120 | Hydronic Valves | 6 |
| 232123 | Hydronic Pumps | 4 |
| 232300 | Refrigerant Piping Systems | 7 |
| 232500 | Water Treatment | 6 |
| 233100 | Air Distribution | 14 |
| 233300 | Air Distribution Accessories | 9 |
| 233400 | Air Distribution Equipment | 11 |
| 233700 | Air Devices | 4 |
| 234100 | Filters | 4 |
| 236420 | Air Cooled Chillers | 6 |
| 238100 | Packaged HVAC Equipment | 8 |

DIVISION 26 – ELECTRICAL

| | |
|--------|---|
| 260500 | Common Work Results for Electrical, Communications, and Electronic Safety and |
|--------|---|

| | | |
|--------|--|----|
| | Security | 12 |
| 260519 | Low-Voltage Electrical Power Conductors and Cables | 5 |
| 260526 | Grounding and Bonding for Electrical Systems | 6 |
| 260529 | Hangers and Supports for Electrical Systems | 5 |
| 260533 | Raceway and Boxes | 10 |
| 260534 | Communications and Electronic Safety and Security Boxes and Raceways | 4 |
| 260543 | Underground Electrical Conduit and Boxes | 8 |
| 260553 | Identification for Electrical Systems | 7 |
| 260573 | Power Systems Protective Device Study..... | 4 |
| 260800 | Commissioning of Electrical Systems | 3 |
| 260923 | Lighting Control System..... | 10 |
| 260961 | Production Venue Lighting Controls | 15 |
| 260962 | Production Venue Distribution Devices | 7 |
| 260999 | Electrical Work for Theatre Equipment | 2 |
| 262200 | Low-Voltage Transformers..... | 5 |
| 262413 | Switchboards | 2 |
| 262416 | Panelboards | 10 |
| 262726 | Wiring Devices | 6 |
| 262816 | Enclosed Switches and Circuit Breakers | 4 |
| 262913 | Motor Control | 6 |
| 263323 | Emergency Engine Generator | 9 |
| 265100 | Interior Lighting | 9 |
| 265600 | Exterior Lighting | 11 |

DIVISION 27 – COMMUNICATIONS

| | | |
|--------|---|----|
| 271500 | Communication Cabling System..... | 12 |
| 272500 | Emergency Responder System | 8 |
| 274116 | Integrated Audio-Video Systems and Equipment..... | 15 |
| 275123 | Communications and Clock | 13 |

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

| | | |
|--------|---------------------------------------|----|
| 281300 | Access Control System | 12 |
| 281600 | Security System | 5 |
| 282300 | Video Surveillance System | 10 |
| 283111 | Fire Detection and Alarm System | 23 |

DIVISION 31 – EARTHWORK

| | | |
|--------|------------------------------------|----|
| 311000 | Site Clearing and Demolition | 9 |
| 312000 | Earth Moving..... | 22 |

DIVISION 32 – EXTERIOR IMPROVEMENTS

| | | |
|--------|---|----|
| 321216 | Asphalt Concrete Paving | 9 |
| 321313 | Concrete Paving, Curbs, and Walks | 6 |
| 321723 | Pavement Markings | 4 |
| 323000 | Site Improvements | 2 |
| 323113 | Chain Link Fences and Gates | 5 |
| 328000 | Irrigation | 10 |
| 329000 | Planting | 15 |

DIVISION 33 - UTILITIES

| | | |
|--------|---------------------------|----|
| 331100 | Water Distribution | 21 |
| 333100 | Sanitary Sewer..... | 13 |
| 334100 | Storm Drainage..... | 7 |
| 334613 | Foundation Drainage | 5 |

END OF SECTION 000110

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
- 2. Demolition and removal of selected site elements.
- 3. Salvage of existing items to be reused or recycled.

- B. Key Abbreviations include the following:

- 1. DEMO Selective Demolition
- 2. SLVG Salvage

- C. Related Requirements:

- 1. Division 00 for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Section 017229 "Cutting and Patching" for cutting and patching procedures.
- 3. Section 015639 "Temporary Tree Protection" for temporary protection of existing trees that are affected by selective demolition.
- 4. Section 311000 "Site Clearing and Demolition" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction in a manner to prevent damage and deliver to Owner, or store safely, until ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully remove and salvage in a manner to prevent damage and promptly return to Owner.

1.5 INFORMATIONAL SUBMITTALS

- A. 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.
- B. 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. Coordination of Owner's continuing occupancy of the site and existing buildings to remain.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.

1.6 FIELD CONDITIONS

- A. Owner will occupy buildings and the site immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose 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. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work except as follows:
 - 1. Contaminated Soil Removal: Specified in Section 026000 "Contaminated Soil Removal"
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.
- E. Storage or sale of removed items or materials on-site is not permitted.

- F. 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.

1.7 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing conditions including any hazardous material information available from the Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of structure 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.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of the site and buildings.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: 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 buildings and site.
 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.
- B. Temporary Shoring: Design, 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.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL (DEMO), (SLVG)

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations 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.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. 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 portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least two hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management & Disposal."
- B. 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.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. 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.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction. and recycle or dispose of them according to Section 017419 "Construction Waste Management & Disposal."
 - 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. Comply with requirements specified in Section 017419 "Construction Waste Management & Disposal."
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

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

3.8 SELECTIVE DEMOLITION SCHEDULE

- A. Remove and Salvage:
 - 1. Historic items, plaques, monuments, etc. that are discovered during selective demolition.

END OF SECTION 024119

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. One drawing, 'Soil Remediation Plan' (Figure 1; PBS, January 2020) applies to this section and is included in this package.
- B. Division 00 and 01 apply to this section.

1.2 SCOPE

- A. This section covers the excavation, staging, transport and treatment/disposal of previously identified contaminated soil planned to be removed at the site.
 - 1. The anticipated volume of contaminated soil to be exported from the project site is approximately 50 cubic yards. See Figure 1 for approximate location.
 - 2. The Contractor is required to document the volume of contaminated soil excavated on a daily basis. Measurements shall be provided at a minimum of one-foot vertical interval.
 - 3. Included work is all required benching, sloping, etc. of soil adjacent to excavated/handled soil, along with segregation of contaminated soil for removal from soil left in place.
- B. Based on preliminary laboratory analysis, disposal of contaminated soil as Ecology defined Category IV petroleum-contaminated soil may be included in the Work and is the responsibility of the Contractor. The Contractor is responsible for determining waste facility requirements and facilitating preliminary waste profiling.

1.3 DEFINITIONS

- A. Authorized Visitor: The Owner or designated representative, or a representative of any regulatory or other agency having jurisdiction over the project.
- B. Controlled Area: Restricted access area limited to authorized project personnel, equipment and materials.
- C. Decontamination Facilities: Controlled area adjacent and connected to areas of work and consisting of protection of the site and spill containment, which is used to decontaminate workers, materials, and equipment.
- D. Disposal: Procedures necessary to transport and deposit contaminated soil, groundwater or other fluids to an approved waste disposal site in compliance with EPA and other applicable regulations.
- E. Environmental Consultant: Environmental consultant specializing in remediation of soil and groundwater and retained by the Owner.
- F. EPA: U. S. Environmental Protection Agency.

- G. Ecology: Washington State Department of Ecology.
- H. Owner: Northshore School District.
- I. Public Area: Any area outside the isolated work area. When work area isolation measures are removed, the work area becomes a public area.
- J. Transport: Hauling of waste from a work site to a disposal site and deposit of the waste by a firm in compliance with the EPA, Washington State and applicable local codes, ordinances and regulations.

1.4 RULES AND REGULATIONS

- A. The current issue of each document shall govern. Where conflict among requirements or with these Specifications exists, the most stringent requirements shall apply. Contractor is responsible for obtaining and understanding each regulation/document, as needed:
 - 1. U.S. Department of Labor Occupational Safety and Health Administration (OSHA).
 - 2. Title 29 Code of Federal Regulations Section 1910.1200--Hazard Communication.
 - 3. CERCLA, Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601 et.seq.)
 - 4. RCRA, Resource Conservation and Recovery Act.
 - 5. MTCA, Model Toxics Control Act, Chapter 70.105 D RCW
 - 6. MTCA Cleanup Regulation, Chapter 173-340 WAC
 - 7. Dangerous Waste Regulations, Chapter 173-303 WAC
 - 8. Federal and State DOT regulations governing transport of petroleum-contaminated media.
 - 9. Washington Department of Ecology (Ecology) "Guidance for Remediation of Releases from Underground Storage Tanks, 2010."
 - 10. Washington Industrial Safety and Health Act (WISHA)
 - 11. All local ordinances, regulations, or rules pertaining to petroleum-contaminated soil or groundwater, including storage, transportation, and disposal.

1.5 SUBMITTALS AND NOTICES

- A. Pre-Construction Submittals: Contractors shall submit the following information prior to beginning work on the project.
 - 1. Permits and Notifications: Submit copy of all required notifications and permits obtained by the contractor and copies of all types of specified bonds and insurance. The Contractor is responsible for obtaining and maintaining all permits and notifications as required for the completion of the work by the Washington State Department of Labor and Industries, the Washington State Department of Ecology, King County, City of Seattle, and any other permitting agency involved with the completion of the work included herein.
 - 2. Soil Management Plan (SMP): Contractor will provide a Soil Management Plan which details proposed soil handling in accordance with this specification section. The SMP will include identifying the Subtitle D landfill or a treatment facility properly permitted to accept Ecology defined Category I/II or III/IV petroleum-contaminated soil. It is noted that waste profiling and a formal agreement with this facility is not required prior to the job start. The

SMP will include the location(s) for contaminated soil to be stockpiled, if encountered, while waste profiling is underway.

3. Site Specific Health and Safety Plan (HASP): Prepare a project HASP developed and implemented in association with the Contractor's standard construction safety program. HASP will comply with all aspects of WAC 296-843-120 (Health and Safety Plan), and will include information specific to worker training, protection and decontamination related to petroleum contaminated soil and working under the assumed presence of identified contaminants. HASP is to be distributed to all on-site employees performing work in the vicinity of contaminated media, who are to read it, sign acknowledgement and abide by all of its provisions. The HASP shall address safe and proper handling of contaminated soil.
 - a. Name and signature of Contractor's designated Safety Representative. Identification of Safety Representative(s) who are specifically trained/experienced in hazard management during construction on sites with identified contaminants;
 - b. Site description and location;
 - c. Site control measures as identified on a site map;
 - d. Pre-entry briefings to be held prior to initiating subsurface work, and at other times to ensure that workers are apprised of HASP provisions and that such a plan is adequate and being followed;
 - e. Chemical hazard analysis to identify and establish appropriate procedures for addressing suspected conditions or activities that may pose routine occupational hazards or immediate danger. The HASP shall describe the risks associated with each task and the actions to be taken to mitigate hazards;
 - f. Contaminated Media Zones, including exclusion, contamination reduction and support zones. Describe procedures to inform all necessary personnel of Contaminated Media Zone requirements. Include specific criteria and contaminant thresholds for establishing Contaminated Media Zone(s);
 - g. Levels of personnel protection to be employed during the Work, including, but not limited to: thresholds and criteria for choices of protective clothing, equipment and respiratory protection (as appropriate) based on the types and concentrations of contaminants and exposure pathways that may be encountered;
 - h. A program for the determination of personnel exposure monitoring requirements as needed. List target contaminants and associated monitoring equipment to be employed;
 - i. Decontamination procedures for personnel, materials and equipment. Include description and general locations of decontamination facilities;
 - j. Description of the equipment and procedures to prevent releases of contaminated media to the soil and water from construction equipment and materials. Include description of equipment and procedures to be used to immediately clean up any releases;
 - k. Procedures and coordination of temporary storage, containerization, handling and disposal of any contaminated media in accordance with these Specifications and all applicable local, State and Federal regulations.
 - l. Emergency Response Plan for safe and effective response to emergencies which establishes emergency procedures including, but not limited to: escape routes, signals for evacuation, emergency communications, and response to fire or explosions. Describe emergency equipment and facilities available off-site;
 - m. Definition of appropriate levels of training and training procedures to promote a safe working environment, including any training requirements defined by applicable regulations or codes;
 - n. A medical surveillance program for eligible employees consistent with 29 CFR 1926.65(f).

- ## 1.6 SITE SECURITY AND PROTECTION

- ## 1.7 SCHEDULE

- ## 1.8 SUBCONTRACTORS

- ## 1.9 EXISTING UTILITIES

- 026000-4

Contractor activities to any utility, including those underground, shall be paid for solely by the Contractor.

1.10 QUALITY ASSURANCE

- A. Performance: Work shall be performed in a skillful manner representing industry standards. The Owner shall require Contractor to remove from the work site employees and subcontractors the Owner or Environmental Consultant deems incompetent, careless or objectionable.
- B. All sample collection and analysis for determination of contamination levels, waste profiling or water discharge will be performed on behalf of the Owner by the Environmental Consultant.
- C. Confirmation Soil Sampling: Upon completion of excavation of known or suspected contaminated media, the Environmental Consultant will collect confirmation samples to document contamination levels. Facilitate sample collection at the direction of the Environmental Consultant.

PART 2 - PRODUCTS

2.1 PROTECTIVE CLOTHING AND EQUIPMENT

- A. Protective Clothing: Provide approved clothing and equipment per HASP.

2.2 MATERIALS

- A. Plastic Sheeting: minimum thickness 6-mil polyethylene sheeting;
- B. Disposal Containers: Must be suitable and properly labeled for containerization, transport and disposal of any cuttings and product or contaminated soils that may require disposal.

PART 3 - EXECUTION

3.1 WORK AREA PREPARATION

- A. Utility Locate: Schedule a utility locates of the project areas a minimum of 48 hours in advance of planned site work.
- B. Controlled Area and Decontamination Facilities: Before beginning excavation of contaminated soil, establish a controlled area around the planned excavation. Establish and demarcate entry/exit locations and describe them in HASP.
- C. Temporary Staging Areas: Establish facilities for temporary staging of excavated soil pending testing of soil prior to transport for disposal/treatment. Install runoff control measures.
- D. Access to Work Area by Others: Except for emergency personnel, the Contractor shall limit access to the Controlled Area to authorized visitors.

- E. Personnel Protection: Ensure proper eyewear, gloves, boots and any other required safety equipment per the Site-Specific HASP are in use at all times.

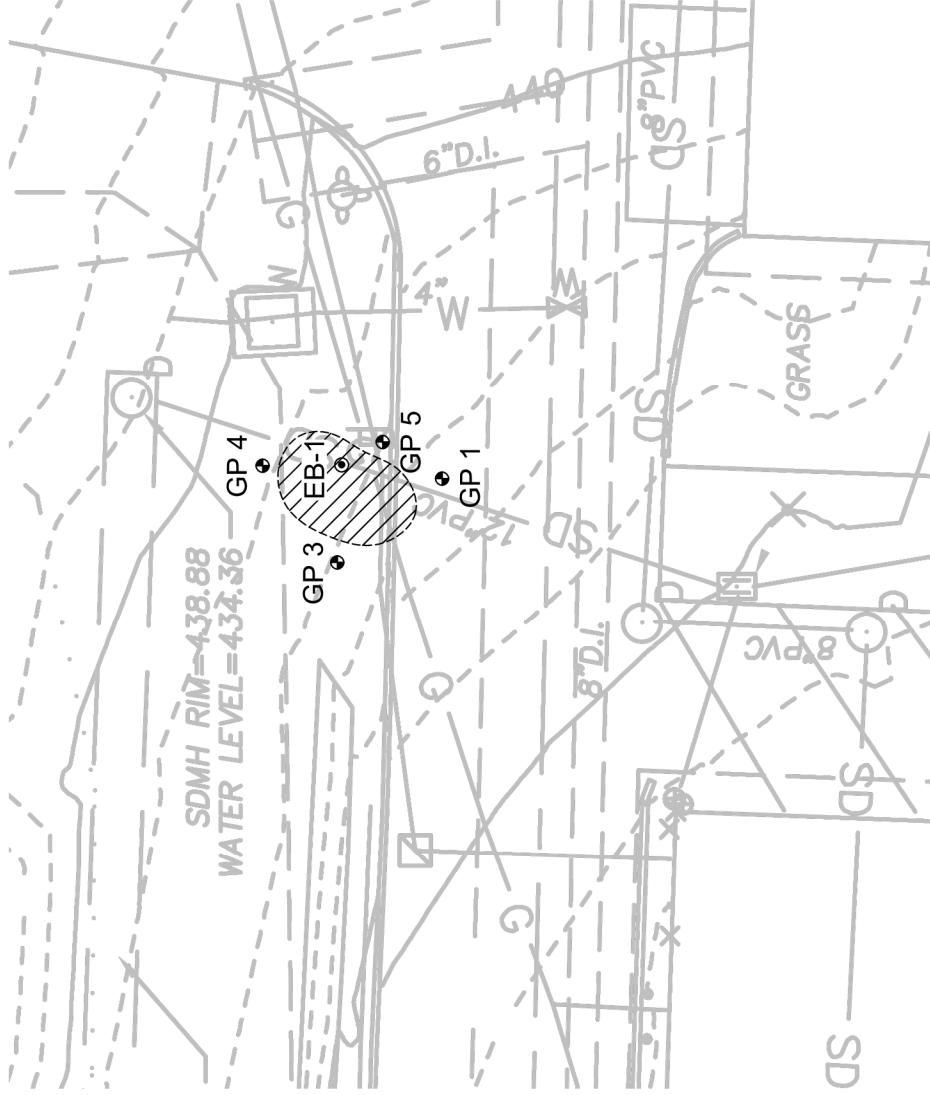
3.2 CONTAMINATED SOIL EXCAVATION

- A. Excavate contaminated soil in a manner that prevents comingling of additional soil. Minimize movement of excavation equipment over or through contaminated soil to prevent comingling.
- B. Stockpiles used for temporary storage shall consist of a minimum 6-mil visqueen, bermed ground layer, and daily cover of soils with visqueen in a manner that will prohibit runoff from the stockpiled soil from wind, rain and elements.
- C. As allowable related to moisture content, load contaminated soil directly into trucks for transport to endpoint disposal facility. Load saturated soil to temporary on-site stockpiles for drying if needed.
- D. Maintain excavation equipment in good working order. Prevent spillage of oil, fuel or hazardous substances from equipment. Promptly repair oil leaks from equipment and clean up any contaminated media.
- E. Load contaminated soil into trucks or containers in a manner that prevents spilling or tracking of contaminated soil. Load contaminated soil within controlled area.
- F. Do not store contaminated soil in drums unless encountered soil is of low volume (<2 cubic yards).
- G. Remove loose material from trucks before trucks leave loading areas. Broom trucks clean before they leave the loading areas. Any contaminated soil collected in loading areas shall either be placed into trucks or back onto stockpile(s) or excavation.
- H. Cover all trucks prior to leaving loading areas. Do not spill or track contaminated soil offsite at any time.
- I. Utilize pre-approved or designated truck routes established in conjunction with other work to be performed under the Contract Documents.
- J. Ensure loaded truck weights are within acceptable limits.
- K. Comply with all applicable local, State or Federal regulations, codes or ordinances governing or regulating transportation of contaminated substances.
- L. Ensure that all drivers of vehicles transporting contaminated substances have in their possession during transport all applicable Washington State and local vehicle insurance requirements, valid commercial driver's license, and vehicle registration and license.
- M. Ensure all drivers of transport vehicles are informed of the nature of material being transported in the form of written manifest and required haul routes to and from off-site disposal facility.
- N. Trucks shall be substance-compatible, licensed and permitted pursuant to Federal, State and local requirements for transportation of contaminated soil.

3.3 DISPOSAL

- A. Regulations: The Contractor shall determine current waste handling, transportation, and disposal regulations for the work site, all transporters and for each endpoint disposal facility. The Contractor must comply with these regulations and U.S. Department of Transportation, EPA, DOE and all other applicable local, state and federal requirements.
- B. Transport: Contractor shall remove all properly labeled waste from the site for disposal at a disposal site designated in the Pre-Job Submittals and operated in accordance with the provisions of 40 CFR 61.156. Notify disposal site in advance of delivery to ensure immediate disposal.
- C. All excavated, contaminated soil shall be disposed of at a pre-approved Subtitle D landfill or a properly permitted treatment facility as Ecology defined Category I/II or III/IV petroleum-contaminated soil.
- D. Submit waste disposal documentation as specified above. Contractor shall make available all documentation related to transport and disposal immediately upon request.

END OF SECTION 026000



| | BENZENE (mg/kg) | XYLENES (mg/kg) | GASOLINE (mg/kg) | DIESEL (mg/kg) | HEAVY OIL (mg/kg) |
|--------------------------------|--------------------|--------------------|---------------------|-------------------|----------------------|
| EB-1 | 0.070 | 26 | 950 | 1,400 | 6,100 |
| GP 1 | ND | ND | ND | ND | ND |
| GP 3 | ND | ND | ND | ND | ND |
| GP 4 | ND | ND | ND | ND | ND |
| GP 5 | ND | ND | ND | ND | ND |
| MTCA METHOD A CLEANUP LEVEL | 0.03 | 9 | 30 | 2,000 | 2,000 |

LEGEND

- GP 1
EB-1
- GEOPROBE BORING (AES 2019)
EXPLORATORY BORING (AES 2018)
- APPROXIMATE AREA WITH POTENTIAL FOR PETROLEUM IMPACTED SOILS. REQUIRE SCREENING AND SEGREGATION OF SOIL REMOVED BY EXCAVATION. POTENTIAL FOR DISPOSAL AS PETROLEUM CONTAMINATED SOIL (PCS).



Scale 1" = 10'

PREPARED FOR: NORTHSORE SCHOOL DISTRICT

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. This Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

- B. Key Abbreviations include the following:

| | | |
|-----|------|---------------------------------|
| 1. | AFC | Architectural Finished Concrete |
| 2. | CIPC | Cast-in-Place Concrete |
| 3. | CJ | Control Joint |
| 4. | CMS | Concrete Mow Strip |
| 5. | CONC | Concrete |
| 6. | CTS | Concrete Topping Slab |
| 7. | FDN | Foundation |
| 8. | FTG | Footing |
| 9. | REBR | Reinforcing Bar |
| 10. | SOG | Slab on Grade |
| 11. | VR | Vapor Retarder |

- C. Related Sections include the following:

- 1. Section 033543 "Special Concrete Floor Finishes" for finishing of concrete floor slabs in addition to finishing specified in this Section.
- 2. Section 071700 "Bentonite Waterproofing" for waterstop.
- 3. Section 071900 "Water Repellents".
- 4. Section 312000 "Earth Moving" for capillary break material under slabs-on-grade.
- 5. Section 321313 "Concrete Paving, Curbs, and Walks" for concrete pavement and walks.

- D. Structural Notes: The content of the structural notes take precedent over any contradictory portion of this section.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- B. Cast-in-Place Architectural Finish Concrete (AFC): Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
- C. 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.
 - e. Architect, Owner, Structural Engineer
2. Preinstallation conference shall include, but not limited to the following:
 - a. Review procedures for conducting work of this Section, including:
 - 1) Submittal requirements.
 - 2) Schedules for testing, inspection, and certifications.
 - 3) Mix designs, admixtures, and additives.
 - 4) Conditions for acceptance of concrete at project site.
 - 5) Placement procedures.
 - 6) Joint spacing, locations and procedures.
 - 7) Finishing options and procedures.
 - 8) Curing and crack control.
 - 9) Testing for acceptable moisture emissions, alkalinity pH levels, and relative humidity of concrete slab prior to installation of flooring finishes.
 - 10) Effect of the above on project schedule.
3. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor slab flatness and levelness measurements, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture shown on the structural drawings. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
1. Submit proposed mix designs at least 15 days in advance of placing operations for each type of concrete. The submitted mix designs shall include the following:
 - a. The Concrete Mix Design Submittal form: Either the Field Experience Method form or the Trial Batch Method form may be used. Fill out the forms in their entirety.

- b. Supporting test data not more than 12 months old. At the Engineer's request, reports from the independent testing agencies may be required to document the test data.
 - c. Statistical analysis in compliance with ACI 301.
 - d. Gradation of fine and coarse aggregate not more than 90 days old (ASTMC 33). No substitution of aggregate type or size from those submitted will be permitted.
 - e. Proportions of all ingredients, including all admixtures added either at time of batching or at the job site. Aggregate weights shall be based upon saturated surface dry conditions.
 - f. Water/cement ratio.
 - g. Slump (ASTM C 143): When high range water-reducing admixtures are used, slump before and after addition of admixture is required.
 - h. Air content of freshly mixed concrete (ASTM C 231).
 - i. Strength is tested at 7 and 28 days. For mixes with a 56-day acceptance strength, strength shall be measured at 7, 28 and 56 days. Strengths shall be tested using 4"x8" cylinders in accordance with ASTM C 31 and ASTM C 39.
 - j. Certification that all ingredients in each mix design are compatible.
 - k. Location or intended use of each mix design.
 - l. Source of all materials.
 - 2. Indicate amounts of mixing water to be withheld for later addition at project site.
- C. Steel Reinforcement Shop Drawings: Prepared by an experienced detailer for reinforcement detailing, fabricating, bending, and placing concrete reinforcement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical attachments, tie spacing, hoop spacing and supports for concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Include special reinforcing required for openings through concrete structures.
- D. Construction Joint Layout: Show location of construction joints, isolation joints and contraction joints. Indicate variations from locations shown on Drawings.
- 1. Structural Drawings identify requirements for construction joints and control joints for concrete topping slabs.
 - 2. Where not shown on Drawings, propose locations for review and acceptance by the Architect.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Welding certificates.
 - B. Product Data. For each of the following:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Waterstops.
 - 6. Curing compounds.
 - 7. Floor and slab treatments.

8. Bonding agents.
9. Adhesives.
10. Vapor retarders.
11. Semi-rigid joint filler.
12. Joint-filler strips.
13. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

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

D. Floor surface flatness and levelness measurements indicating compliance with ASTM E 1155.

E. Field quality-control reports.

F. 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: The Owner will engage an independent testing 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-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician – Grade-1. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician – Grade II.

D. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
2. ACI 318, "Building Code Requirements for Reinforced Concrete."
3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

- E. Materials and installed work may require testing and re-testing at any time during progress of Work. Re-testing of rejected materials for installed Work, shall be done at Contractor's expense.
- F. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- G. Source Limitations for Cast-in-Place Architectural Finish Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from one manufacturer with resources to provide cast-in-place architectural finish concrete of consistent quality in appearance and physical properties.
- H. Welding Qualifications: Quality procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code – Reinforcing Steel."
- I. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5. At Exposed Concrete: Sections 1 through 5 and Section 6, "Architectural Concrete."
 - 2. ACI 303R and ACI 303.1, "Specification for Cast-in-Place Architectural Concrete."
 - 3. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - 4. ACI 318 – Building Code Requirements for Reinforced Concrete.
 - 5. ACI 347 – Recommended Practice for Concrete Formwork.
 - 6. ACI 315 – Manual of Standard Practice for Detailing Reinforced Concrete Structures.
 - 7. ASTM 615 – Deformed and Plain Billet Steel Bars for Concrete Reinforcing.
- J. Reinforcing Placement Tolerances: Position, secure and support reinforcing steel within the following tolerances:
 - 1. Concrete cover to finish formed surfaces, +/- ¼ inch.
 - 2. Minimum spacing between bars, +/- ¼ inch.
 - 3. Top bars in slabs, members 8 inches deep or less, +/- ¼ inch.
 - 4. Space reinforcing steel crosswise in members evenly within 2 inches.
 - 5. If reinforcing bars are displaced, or if it is necessary to move bars to avoid interference with other reinforcing or embedded items, and if bars are moved to exceed tolerances, obtain approval from Engineer of resulting arrangement prior to placing concrete.
- K. Mockups: Cast Concrete slab-on-grade and formed footing and foundation wall to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Slab-on-grade: Approximately 15 feet by 15 feet in location as directed by Architect.
 - 2. Do not incorporate mock-ups into Work.
 - 3. Protect all Architect accepted mock-up as standard of quality for work of this section for duration of project.

1.8 DELIVERY, STORAGE, AND HANDLING

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

- B. Store materials in accordance with CI 301. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used, unless retested and proven to meet the specified requirements.
- C. Deliver reinforcing steel to project site in such quantities as to ensure continuity of installation.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting concrete floor topping performance.
 - 1. Place concrete floor topping only when ambient temperature and temperature of substrate is between 50 and 86 deg F.
- B. Close areas to traffic during topping application and, after application, for time period recommended in writing by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. 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.
- B. Form-Facing Panels for As-Cast Finishes (AFC): Steel, glass-fiber reinforced plastic, or other approved non-absorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

- C. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- D. Forms for Cylindrical Columns, Pedestals, and Supports (AFC): Metal, or glass-fiber-reinforced plastic tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- F. Chamfer Strips: Wood or PVC type; $\frac{3}{4}$ " x $\frac{3}{4}$ " or as indicated on the drawings, maximum possible length.
- G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Manufactured by Burke, Non-Crete Industrial Synthetics Corporation or Approved Equal.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal. Burke, Superior or approved high-strength wire snap ties with flattened break-offs; break backs and lengths as required for the conditions of the installation; non-corrosive and non-staining finish.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 REINFORCEMENT MATERIALS (REBR)

- A. Refer to General Structural Notes on drawings.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed, unless noted otherwise.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice" of greater compressive strength than concrete and as follows:

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

F. Tie Wire: Minimum 16 Gage Annealed type.

2.4 CONCRETE MATERIALS (CONC), (SOG), (CIPC), (AFC), (FDN), (FTG), (CTS), (CMS)

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

1. Portland Cement: ASTM C 150, Type I or II, gray. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.
 - b. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
 - c. Calcined Pozzolan: ASTM C 618, Class N.
 - d. Silica Fume: ASTM C 1240, amorphous silica.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1- inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330/C 330M, 1-inch nominal maximum aggregate size.

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

2.5 ADMIXTURES

A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.

B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F.

C. Use air-entraining admixture in exterior exposed concrete in accordance with General Structural Notes. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:

1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
 - a. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) for 3/4-inch maximum aggregate.
 - b. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) for 1/2-inch maximum aggregate.

2. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent air.
- D. Use admixtures in strict compliance with manufacturer's directions.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures. Refer to General Structural Notes on drawings.
1. Available Products: Subject to compliance with requirements, provide one of the following:
 - a. Ait-Tite, Cormix Construction Chemicals.
 - b. Air-Mix or Perma-Air, Elucid Chemical Co.
 - c. Darex AEA or Daravair, W.R. Grace & Co.
 - d. MB-VR or Micro-Air, Master Builders, Inc.
 - e. Sealtight AEA, W.R. Meadows, Inc.
 - f. Sika AER, Sika Corp.
- F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
 7. Shrinkage Reducing Admixture: ASTM C157.
- G. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
1. Products: Subject to compliance with requirements, provide the following:
 - a. Euclid Chemical Company (The); Eucon CIA.
 - b. Grace Construction Products, W.R. Grace & Co.; DCI.
 - c. Master Builders Inc.; Rheocrete CNI.
 - d. Sika Corporation; Sika CNI.
- H. Shrinkage Reduction Admixture: For exposed interior concrete slabs scheduled for sealer/hardener, ASTM C157.
1. Products: Subject to compliance with requirements, provide the following:
 - a. Grace Construction Products; Eclipse Floor 200.
 - b. BASF Products; Masterlife SRA SRA 035.
 - c. Or approved per performance requirements below.

2. Dosage: 1.5 gallons of admixture per cubic yard of concrete for aforementioned approved products (alternative products may be submitted for approval with dosage required to limit shrinkage to 0.03% at 28 days per manufacturer's ASTM C157 test data.) Admixture volume shall replace equal volume of water.
 3. Site –mixing of admixture is not allowed.
- I. Prohibited Admixtures: Calcium chloride throcanates or admixtures containing more than 0.1 percent chloride ions are not permitted.

2.6 VAPOR RETARDERS

- A. Plastic Vapor Retarder (VR): ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
1. Available Products:
 - a. Fortifiber Corporation; Moistop Ultra 15.
 - b. Stego Industries, LLC; Stegowrap 15 mils.

2.7 FLOOR AND SLAB TREATMENTS

- A. Hardener: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
1. Available Products:
 - a. Burke by Edoco; Titan Hard.
 - b. ChemMasters; Chemisil Plus.
 - c. Conspec Marketing & Manufacturing Co., Inc. a Dayton Superior company; Intraseal.
 - d. Curecrete Distribution Inc.; Ashford Formula.
 - e. Euclid Chemical Company (The); Euco Diamond Hard.
 - f. L&M Construction Chemicals, Inc.; Seal Hard.
 - g. Meadows, W.R., Inc.; Liqui-Hard.
 - h. Nox-Crete Products Group, Kinsman Corporation; Duranox.
 2. Areas requiring Hardeners, including all flatwork and housekeeping pads:
 - a. Mechanical Rooms.
 - b. Electrical Rooms.
 - c. Elevator machine Rooms.
 - d. Janitor Rooms.
 - e. Communication Rooms.
 - f. Exposed stair treads and landings.
 - g. Areas with exposed concrete floors where floor finish schedule on plans call for "CONC".

- B. Sealer: Exposed concrete slabs shall be treated with a penetrating, colorless, inorganic silicate or silicate concrete sealer. Sealer shall be compatible with all other materials in this Section and related work.
 - 1. Available Products:
 - a. Sinak Corporation; Sinal S-102.
 - b. Euclid Chemical Company; EucoGuard S040.
 - c. Degussa; Chem-Trete BSM 40 VOC.
 - d. Hydrozo, Hydrozo Silane 40 VOC.
 - 2. Areas requiring Sealers:
 - a. Mechanical Rooms.
 - b. Electrical Rooms.
 - c. Elevator machine Rooms.
 - d. Janitor Rooms.
 - e. Communication Rooms.
 - f. Exposed stair treads and landings.
 - g. Areas with exposed concrete floors where floor finish schedule on plans call for "CONC".

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Axim Concrete Technologies; Cimfilm
 - b. Burke by Edcoc; BurkeFilm.
 - c. ChemMasters, Inc.; Spray-film.
 - d. Conspec Marketing & Manufacturing Co., a Dayton Superior Company; Aquafilm.
 - e. Dayton Superior Company; Aqua Film Concentrate, J74.
 - f. Euclid Chemical Company (The); an RPM company; Eucobar.
 - g. L&M Construction Chemicals, Inc; E-Con.
 - h. Meadows, W.R., Inc.; Sealtight Evapre.
 - i. Nox-Crete Products Group; Monofilm.
 - j. Sika Corporation; SikaFilm.
 - k. Symons Corporation, a Dayton Superior Company; Finishing Aid.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ChemMasters, Inc; Spray-Cure & Seal Plus.
 - b. Euclid Chemical Company (The); an RPM company; Super Diamond Clear.
 - c. L&M Construction Chemicals, Inc; Dress & Seal WB.
 - d. Nox-Crete Products Group; Kure-N-Seal 200E.
 - e. W.R. Meadows; 1100-Clear.

F. Coordinate curing materials with flooring requirements to ensure compatibility.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Interior Semirigid Joint Filler: ASTM D 2240 Shore A 75-85. Industrial quality, two component, semi-rigid polyurea, USDA approved, matching approximate color of concrete finish. Specified for type and quality.

1. Available Products:

- a. Degussa Building Systems, MBT Protection & repair Div., Materfill 400 CT.
- b. Euclid Chemical Company, Euco QWIKJoint UVR.
- c. L&M Construction Chemicals, Inc.; Joint Tite 750.
- d. Polyurea Sealant: VersaFlex, SL/75.

- C. Bonding Agents: ASTM C 1059, Type II and ASTM C 1042 Type II, non-redispersible, acrylic emulsion designed to bond new concrete and portland cement sand mixes to horizontal and vertical in-place concrete at interior and exterior conditions.

1. Available Products:

- a. Chemrex; Comcresive Liquid LPL.
- b. W.R. Grace; Daraweld C.
- c. Larsen Products Corp.
- d. Weldcrete Sonneborn, Sonocrete.

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

1. Types I and II, non-load bearing for general bonding of freshly mixed concrete to hardened concrete in accordance with General Structural Notes.

E. See General Structural Notes for epoxy adhesive to be used for grouting of dowels, anchor rods, etc. where specified.

F. Reglets: Fabricate reglets of not less than 0.0217-inch-thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

- G. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336-inch-thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, 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 or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4000 psi 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 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, 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 or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 PROPORTIONING AND DESIGN MIXES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
 - 2. See General Structural Notes for minimum compressive strength and additional requirements.
 - 3. Exposed to View Concrete: Conform to ACI 301 Chapter 6, ACI 303.1 and ACI 303R for Architectural Concrete, except concealed concrete and non-public utility areas.
 - a. Prepare mix design information for concrete batch weights with bulk-specific gravity determinations for aggregates based on saturated surface dry (SSD) condition. Include mix information sufficient to verify through absolute volume calculations:
 - 1) Concrete Yield.

- 2) Cement Factor.
 - 3) Water/Cement Ratio.
 - 4) Mortar to Voids Ratio.
- b. When adjustment to mix design becomes necessary due to job conditions, weather, test results, changes in material properties, or other circumstances, resubmit new mix design for acceptance by Architect/Structural Engineer prior to pouring concrete.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Combined Fly Ash and Pozzolan: 25 percent maximum for footings; 15 percent maximum for slabs.
 2. Silica Fume: 10 percent.
 3. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 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 corrosion-inhibiting admixture in concrete mixtures where indicated.
 4. Use Shrinkage-Reducing Admixture at exposed interior concrete slab at "Concert Hall 114".
- E. Proportion normal-weight concrete mixtures as follows:
1. Minimum Compressive Strength: As specified per General Structural Notes, unless otherwise noted.
 2. Maximum Water-Cementitious Materials Ratio: As specified per General Structural Notes.
 - a. For mixes containing Shrinkage-Reducing Admixture, maximum water content shall be 250 pounds per cubic yard.
 3. Air Content for Exterior Surfaces Exposed to Standing Water: In accordance with ACI 318 Table 4.4.1.
 4. Slump: As specified per General Structural Notes (with water reducing admixture included).
 5. Aggregate: Gradation well-proportioned and distributed with largest top size coarse aggregate of 1 inch. Coarse aggregate shall include 3/8-inch aggregate. Coarse to fine aggregate ratio shall be between 1.5:1 and 2:1.

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 as specified in the General Structural Notes.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, shrinkages, keyways, recesses, moldings, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in the Work.
- D. Chamfer exterior corners and edges or permanently exposed concrete.
- E. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class C, 1/2 inch for rough-formed finished surfaces.
- F. Construct forms tight enough to prevent loss of concrete mortar.
- G. Fabricate 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.
- H. 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.

- I. 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.
- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with an approved, nonresidual, low VOC, form-coating compound before placing reinforcement.
- N. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturers instructions.
 - 1. Coat steel forms with a non-staining, rust-preventative material. Rust stained steel formwork is not acceptable.

3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANCI/AISC 303.
 - 3. 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.
 - 4. Electrical conduit shall not be embedded in metal deck topping slabs without prior approval from Structural Engineer.

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 for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 INSTALLATION OF VAPOR RETARDERS

- A. Vapor Retarders: Place, protect, and repair sheet vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 1. Place continuous vapor retarder/barrier directly below all concrete slab-on-grade.
 2. Terminate vapor retarder at the top of floor slabs, sealing entire perimeter to foundation wall, unless otherwise indicated.
 3. Install vapor retarder with longest dimension parallel with direction of concrete pour.
 4. Face laps away from exposed direction of concrete pour.
 5. Lap joints 6 inches and seal with manufacturers recommended tape. Use vapor retarder sheet to "boot" around all penetrations and seal with tape to create a continuous vapor retarder.
 6. Seal all penetrations with manufacturers recommended tape or mastic in accordance with vapor retarder manufacturer's instructions.
 7. Do not penetrate vapor retarder with screed pins, wood stakes or other items.
 8. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damaged areas by 6 inches on all sides, and sealing to vapor retarder.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 1. Weld reinforcing bars according to AWS D1.4, 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 (CJ)

- A. Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect. See structural drawings for requirements and submit joint layout to Architect for approval.
 - 1. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints, unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs. See structural drawings for acceptable joint types.
 - 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 4. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. 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. See structural drawings for requirements.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants." Are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- D. Contraction (Control) Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into approximately square areas indicated and as approved by Architect, but not larger than indicated on the structural drawings. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness. See architectural and structural drawings for control joint requirements at slabs-on-grade.
 - 1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

2. Contraction joints in floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate (normally 2 hours maximum after final finishing or 150 psi).
3. Maximum spacing: In accordance with the architectural and structural drawings.
 - a. Maximum Spacing, unless noted otherwise: 15'-0" at unexposed slabs and 12'-0" for exposed slabs.
4. If joint pattern is not shown, provide layout for approval by Architect as indicated under Submittals.

E. Early-Entry Dry Sawn Control Joints (At Exposed Slabs):

1. Control Joints in Slabs: Sawcut floors 0 to 2 hours after final troweling using Soff-Cut International Model #280, or approved, saw with 5-1/2-inch blade. Cut 1/8-inch-wide by 1 inch to 1-3/16-inch-deep joints, per manufacturer's instructions. Extend sawcuts to edge of slabs at obstructions by tooling to same configuration as sawcut. Form panels of patterns indicated or, if not indicated, locate joints at 15 feet on center maximum for unexposed slabs and 12 feet on center for exposed slabs, and with joint at each grid line. Obtain Architect's approval of joint layout by submittal approval process prior to concrete pour. Control joint inserts may be used in lieu of sawcuts only for concealed joints.
2. Conventional (hard) sawcutting is not permitted. Other control joint methods are subject to Architect's written approval.
 - a. Provide a minimum of 5 Soff-Cutt saws on project during concrete pours (all in maintained and working order) with labor to operate saws within 1 hour of concrete set to allow saw-cutting installation within a 2-hour period.
 - 1) Saw-cutting with unmaintained equipment, dull blades, worn wear plates and saw-cutting late will be reason for rejection of exposed concrete slab and the Contractor will be required to remove and replace the slab at his own expense.
 - b. Rejection: Joint construction that is not in compliance with the above will be grounds for Architect's rejection of Work. Slab, gravel raveling, or aggregate spalling will not be acceptable at joints exposed to view. Late cutting of control joints in exposed slabs will be grounds for rejection of slab work.

F. Doweled Joints:

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

3.7 CONCRETE TOPPING SLABS

A. Bonded Topping Slabs, Mortar Beds, and Underlayments:

1. Broom finish and vacuum base slab clean. Remove all bond inhibiting materials.
2. Where specified or required, roughen or sandblast surface of base slab.
3. Install reinforcing steel and other cast-in items.

4. Apply bonding agent to base slab in accordance with manufacturer's instructions.
- B. Unbonded Topping Slabs with Membrane Below:
 1. Broom and vacuum clean base slab prior to installing specified membrane.
 2. Install reinforcing steel and other cast-in items.
- C. Topping Slabs on Metal Deck:
 1. Broom and vacuum clean. Remove all bonding inhibiting materials, including plastic ferrules where shear studs occur.
- D. Install reinforcing steel and other cast-in items. Electrical conduits shall not be embedded in topping slabs without prior approval from Structural Engineer.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete. Notify other trades to permit installation of their work. Special inspection shall be provided in accordance with the General Structural Notes.
 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as work progresses.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. 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.
 1. If a section cannot be placed continuously, provide construction joints as indicated.
 2. Deposit concrete to avoid segregation.
 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 4. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. 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.

- D. 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. At exposed slabs, backfill column block outs (and other on-grade depressions) prior to slab pours to achieve a uniform slab thickness. Prevent irregularities in slab thickness that prevent uniform shrinkage and cause slabs to crack.
 - 3. Maintain reinforcement in position on chairs during concrete placement.
 - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 5. Slope surfaces uniformly to drains where required.
 - 6. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 - 7. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Placement: Comply with provisions of ACI 306 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 air temperature has fallen to or is expected to fall below 40 deg F uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 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.
 - 4. See Structural General Notes for additional requirements.
- F. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 - 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
 - 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, only with prior approval of Architect. See Structural General Notes for additional requirements.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view and where indicated as AFC.
- C. 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.

3.10 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
 - 1. At slabs-on-metal deck, account for deflection of metal deck during placement of wet concrete such that top of slab elevation is screeded off level between adjacent deck supports. See deck manufacturer's literature for approximate deck deflection values. Notify Structural Engineer if deck deflection exceeds $\frac{3}{4}$ ". At cambered supports, set screed pins along each support to a uniform height based on the specified slab thickness.
- B. Scratch Finish:
 - 1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
 - 2. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 - 3. Apply scratch finish to surfaces to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish:
 - 1. Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
 - 2. Restraighten, cut down high spots, and fill low spots.
 - 3. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 - 4. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.
- D. Trowel Finish:
 - 1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
 - 2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
 - 3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

4. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, or ceramic tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 5. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified values of flatness for suspended floors, F(F) 30; with minimum local values of flatness, F(F) 20.
 - b. Specified values of flatness for slab-on-grade floors, F(F) 40; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 25; and of levelness, F(L) 25.
 6. Finish and measure surface, so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
 2. Coordinate required final finish with Architect before application.
- F. Non-slip Aggregate Finish: Aluminum oxide grit at interior concrete stairs, ramps, landings and similar surfaces.

3.11 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
1. Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place.
 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
 3. 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 high unless otherwise indicated and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment.
 3. Provide machine and equipment bases and foundations as shown or indicated on Architecture, Mechanical and Electrical Drawings.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories as shown on the Drawings.
2. Screed, tamp and trowel-finish concrete surfaces.

3.12 CONCRETE PROTECTING AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 306.1 for cold-weather protection during curing.
2. Comply with ACI 301 for hot-weather protection during curing.

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

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

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

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

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch 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, 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 moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall

within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

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

3.13 FLOOR AND SLAB TREATMENTS

- A. Apply Curing Agent and Sealer to new concrete as soon as the concrete is firm enough to work on after troweling, except on colored concrete wait minimum of 30 days.
 1. Spray on at rate of 200 square feet per gallon (4.8 sq m/L).
 2. Keep surfaces wet with Curing Agent and Sealer for minimum soak-in period of 30 minutes, without allowing drying out or becoming slippery. In hot weather slipperiness may appear before the 30-minute time period has elapsed. If that occurs, apply more cure-seal-hardener as required to keep entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state.
 3. After this period, when treated surface becomes slippery lightly mist with water until slipperiness disappears.
 4. Wait for surface to become slippery again and then flush entire surface with water removing all residue of Curing Agent and Sealer.
 5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
 6. Wet vacuum or scrubbing machines may be used to remove residue, provided manufacturer's instructions are followed.

3.14 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.
 2. 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 joint clean and dry.
- C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
- D. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 PROTECTION

- A. Protect all concrete surfaces from damage by other trades until Substantial Completion.
- B. Method of protection to be determined by General Contractor to comply with the following provisions.

C. Concrete Slabs:

1. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential.
 - a. All hydraulic powered equipment must be diapered to avoid staining of the concrete.
 - b. No trade shall park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
 - c. No pipe cutting machine will be used on the inside floor slab.
 - d. Steel will not be placed on interior slab to avoid rust staining.
 - e. All equipment must be equipped with non-marking tires.
2. Provide protective covering acceptable to contractor installing special concrete floor finishes and maintain until installation of special concrete floor finishes begins.

3.16 CONCRETE SURFACE REPAIRS (PATCHING)

A. Defective Concrete

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 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 in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

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

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01-inch-wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch 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 clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch 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.

3.17 CONCRETE REPAIRS (STRUCTURAL)

- A. This includes the materials, testing and workmanship to structurally repair cracks in new concrete, Epoxy resin adhesive shall be used in an injection mode to effect the repairs.
- B. Cracks larger than 0.01 inch and which extend through the full depth of the slab or wall, or are subject to allowing water leakage through the crack, shall be repaired by epoxy injection as directed by the Owner's Representative and as specified herein. All costs associated with the crack repairs shall be the responsibility of the Contractor. A determination of the cracks requiring repair shall be made by the Owner's Representative near the time of Substantial Completion, assuming that some of the drying shrinkage has had time to occur.
- C. Submit the following information for the firm engaged for crack repair:
1. Previous experience information.

2. Qualifications of applicators.
3. Epoxy manufacturer's certification.
4. Technical data on materials used.

3.18 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. 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.
 8. See the Quality Assurance Plan in General Structural Notes for additional requirements.
- C. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.
 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F. and below, when 80 deg F and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 4. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi. See General Structural Notes.
- D. The contractor is responsible for providing "controlled environment protection" of the test cylinders that are being stored on site by Owner's Testing Agency. The means and methods of "controlled environmental protection" shall be approved by the Owner prior to implementation.
- E. Test results will be reported in writing to Owner, Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection
- G. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.
- H. Correction: Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.
- I. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing and promptly report test results to Architect.

END OF SECTION 033000

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. Polished concrete finishing, joint filling, crack & spall repair.
 - 2. Concrete for polished concrete, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 033000 "Cast-in-Place Concrete."
- B. Key Abbreviations include the following:
 - 1. SCFF Special Concrete Floor Finish
- C. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for concrete not designated as polished concrete.

1.3 REFERENCES

- A. American Concrete Institute (ACI)
 - 1. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
- B. ASTM International
 - 1. ASTM C309 – Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete.
 - 2. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
 - 3. ASTM C779 – Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
 - 4. ASTM C805 – Standard Test Method for Rebound Number of Hardened Concrete.
 - 5. ASTM D4039 – Standard Test Method for Reflection Haze of High-Gloss Surfaces.
 - 6. ASTM D5767 – Standard Test Method for Determining the Distinction of Image of Hardened Concrete (Gloss).
 - 7. ASTM E115 – Standard Test Method for Determining Floor Flatness and Levelness Using the F number system.

1.4 PERFORMANCE REQUIREMENTS

- A. Performance Requirements: Provide polished flooring that has been selected, manufactured and installed to achieve the following:
 - 1. Abrasion Resistance: ASTM C779, up to 400% increase in abrasion resistance.
 - 2. Reflectivity: Increase of 35% as determined by the gloss meter.
 - 3. Impact Strength: ASTM C805, up to 21% increased impact strength.
 - 4. Must meet or exceed ANSI B101.3 suggested 0.42 standard value for the Dynamic Coefficient of Friction.
 - 5. NFSI rated High Traction floor.
- B. Design Requirements
 - 1. Hardened Concrete Properties
 - a. Minimum Concrete Compressive Strength: 3500 psi.
 - b. Normal Weight Concrete, No light weight aggregates.
 - c. Non-air entrained concrete.
 - 2. Placement Properties for new concrete
 - a. Natural concrete slump of 4-1/2-inches – 5-inches; Admixtures may be used.
 - 3. Hard-Steel Troweled (3 passes) Concrete
 - a. ACI 302 Class 3 – “Light-troweled” finish with the final pass using steel reinforced plastic finishing blades. Uniform tight finish without burn marks, meeting the surface tolerance requirements.
 - 4. Curing Options
 - a. Membrane forming curing compounds (ASTM C309, Type 1, Class B, all resin dissipating cure). Acrylic curing and sealing compounds not recommended.
 - b. Sheet membrane (ASTM C171) Polyethylene film not recommended.
 - c. Damp Curing: Seven-day cure.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site prior to placing concrete for areas scheduled for polishing.
 - 1. Review cold- and hot-weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, and protection of polished concrete.

1.6 ACTION SUBMITTALS

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

1.7 INFORMATIONAL SUBMITTALS

- A. Test Reports: Certified test reports, from an Independent Testing Laboratory, showing compliance with specified performance criteria and physical properties as cited in "Performance Requirements".
- B. Certificates:
 - 1. Product and installer certificates signed by the manufacturer certifying materials meet specified performance characteristics and criteria and physical requirements.
 - 2. Current installation contractor's certificate signed by manufacturer declaring contractor as a certified installer of polishing system.

1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For polished concrete finishing to include in maintenance manuals. Also include the following:
 - 1. Manufacturer's instructions on maintenance renewal of applied treatments.
 - 2. Protocols and product specifications for joint filling, crack repair and surface repair.

1.9 QUALITY ASSURANCE

- A. Manufacturers Qualifications:
 - 1. Manufacturer has a minimum of 5-years of experience in manufacturing components similar to or exceeding requirements of project.
 - 2. Manufacturer must be able to provide technically trained field representative during construction and approving application method.
- B. Installer Qualifications
 - 1. Installer experienced in performing work of this section who has specialized in installation work similar to that required for this project.
 - 2. Installer trained and having current certification for specified Concrete Polishing System.
- C. Mockups:
 - 1. Mock-up Size: 10'x10' floor area at job site, at location directed under conditions similar to those which will exist during actual placement. Divide mock-up area into 4 equal zones, allowing for sequential attempts to determine amount of aggregate exposure and shine selection.
 - 2. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, and shine level.
 - 3. Allow 48 hours for inspection of mock-up before proceeding with work.
 - 4. When accepted, mock-up will demonstrate minimum standard of quality required for this project. Once mock-up is approved, protect for the duration of the project.
 - 5. Aggregate exposure, DOI gloss and haze index shall be:
 - a. Aggregate Appearance Classes per ASCC Concrete Polishing Council:

- 1) Class A – Cement Fines (commonly called: Cream Finish) 85-95% fines; 5-15% fine aggregate.

b. Acid Wash Concrete Appearance Levels per ASCC Concrete Polishing Council:

- 1) Level 1 – Flat [Ground]: Flat appearance; up to 100 grit polish; a DOI reading of 0-9; Haze Reading <10; Reflective Sheen; None to very low.

1.10 DELIVERY, STORAGE & HANDLING

- A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Delivery: Deliver materials in manufacturer's original packaging with identification labels and seals intact.
- C. Storage and Protection:
 1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 2. Protect concrete slab:
 - a. Protect from petroleum stains during construction.
 - b. Diaper all hydraulic lifts and power equipment.
 - c. No pipe cutting machinery to be used on interior floor slab.
 - d. Steel will not be placed on interior floor slab to avoid rust staining.
 - e. No acids or acidic detergents will come into contact with slab.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not install work until ambient temperature and humidity conditions are maintained at levels indicated in reference standards.

1.12 WARRANTY

- A. Manufacturer's Warranty: Ten (10) year labor and material warranty document executed by authorized Certified Applicator company official.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. Ensure concrete finishing components and materials are from single source, from single manufacturer.

2.2 ACID WASH CONCRETE FINISHING PRODUCTS (SCFF)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Advanced Floor Products, RetroPlate Systems.
 - 1. Contact: PO Box 80533, Provo, UT 84606, Telephone: (800) 998-5664.
 - 2. Pacific NW Representative: RJ Ogden Associates, Inc. (206) 498-4075.
- B. Products/Systems:
- C. Hardner, Sealer, Densifier: RetroPlate 99 – penetrating, water-based, odorless liquid, VOC compliant, environmentally safe chemical, will leave no film on surface.
- D. Oil Repellent Sealer: RetroGuard.

PART 3 - EXECUTION

3.1 MANUFACTURERS INSTRUCTIONS

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, and Advanced Floor Products Spec-Data sheets.

3.2 EXAMINATION

- A. Site Verification of Conditions
 - 1. Verify that concrete substrate conditions, which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of finishing materials.
 - 2. Verify concrete is cured to 28 days or 3500 psi strength.

3.3 PREPARATION

- A. Ensure surfaces are clean and free of dirt and other foreign matter harmful to performance of concrete finishing materials.
- B. Examine surface to determine soundness of concrete for polishing.

3.4 INSTALLATION

- A. Floor Surface Acid Wash and Treatment
 - 1. Provide Acid Wash over concrete in entirety of slab indicated in Drawings.
 - 2. Provide consistent finish in all contiguous areas.
 - 3. Neutralize floor before applying hardener.

- a. Apply RetroPlate 99 at 200 sq. ft. per gallon, according to manufacturer's directions.
- b. Apply RetroGuard according to manufacturer's directions.

3.5 CLEANING

- A. The work area shall be kept clean and free of debris at all times.
- B. Dispose of material containers in accordance with local regulations.
- C. Mechanically scrub treated floors with soft to medium pads using approved cleaning solution (Crete Clean Plus with ScarGuard). Leave one MasterCase of CreteClean 12 oz. Single Dose and instructions for initial cleanings, along with contact information for end user to request a custom Standard Operating Procedure for their facility.

3.6 PROTECTION

- A. Protect installed product (polished floors) from damage during construction, following completion of the final polishing, by covering. Cover with durable breathable product such as breathable Homasote Board. Do not cover with Masonite, Plywood or Visqueen. Floor must be allowed to breath during final curing.

END OF SECTION 033543

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. Architectural precast concrete stair treads, landings, risers and walkways.
- B. Key Abbreviations include the following:
 - 1. PCU Precast Concrete Unit
- C. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for installing connection anchors in concrete.
 - 2. Section 051200 "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.
 - 3. Section 055000 "Metal Fabrications" for kickers and other miscellaneous steel shapes.

1.3 DEFINITIONS

- A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
- C. Shop Drawings:
 - 1. Detail fabrication and installation of architectural precast concrete units.
 - 2. Indicate member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
 - 3. Indicate joints, reveals, chamfers, and extent and location of each surface finish.
 - 4. Indicate type, size, and length of welded connections by AWS standard symbols.
 - 5. Detail loose and cast-in hardware, lifting and erection inserts, connections and joints.

6. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 7. Include plans and elevations showing unit location and sequence of erection for special conditions.
 8. Indicate location of each architectural precast concrete unit by same identification mark placed on panel.
 9. Indicate relationship of architectural precast concrete units to adjacent materials.
 10. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.
1. When other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.
- E. Delegated-Design Submittal: For architectural precast concrete 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. Show governing panel types, connections, types of reinforcement, including special reinforcement, and concrete cover on reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural precast concrete.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
1. Designated as a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units at time of bidding or designated as an APA-certified plant for production of architectural precast concrete products.
 2. Firm must have a minimum of 5-years successful experience in fabrication of architectural precast concrete units similar to members required for this project. Fabricator must have sufficient production capacity to produce, transport and deliver required units without causing delay in the Work.
- B. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with

PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Support units during shipment on nonstaining shock-absorbing material.
- B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
- C. Place stored units so identification marks are clearly visible, and units can be inspected.
- D. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.
- E. Lift and support units only at designated points indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer registered in the State of Washington, to design architectural precast concrete units.
- B. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.
- C. Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:
 - 1. Live Loads: As indicated on structural drawings.
 - 2. Deflection: Maximum of L/240 for Total Load and L/480 for Live Load.

2.2 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 - 1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.

2.3 REINFORCING MATERIALS

- A. Reinforcing Bars: Manufacturer's standard coated steel reinforcing suitable for conditions of installation and imposed loads.

2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.
 - 1. For surfaces exposed to view in finished structure, use gray cement, of same type, brand, and mill source.
- B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33/C 33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 - 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - a. Gradation: Uniformly graded.
 - 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.
- C. Coloring Admixture: ASTM C 979/C 979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
 - 1. Allow up to 2-lbs. per sack of cement.
- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
 - 1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
 - 5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 7. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 ACCESSORIES

- A. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.

2.6 GROUT MATERIALS

- A. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion full-depth mixture by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi minimum.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
 - 1. Coloring Admixture.

2.8 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
- B. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

1. Form joints are not permitted on faces exposed to view in the finished work.
2. Edge and Corner Treatment: Uniformly radiused.

2.9 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.
- C. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
 1. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 2. Place reinforcing steel and prestressing strands to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
- D. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.
- E. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- F. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
- G. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.
 1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.
- H. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.

- I. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.
- J. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- K. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.10 FABRICATION TOLERANCES

- A. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with the following product tolerances:
 - 1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
 - a. 10 feet or under, plus or minus 1/8 inch.
 - b. 10 to 20 feet, plus 1/8 inch, minus 3/16 inch.
 - 2. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
 - a. 10 feet or under, plus or minus 1/4 inch.
 - b. 10 to 20 feet, plus 1/4 inch, minus 3/8 inch.
 - 3. Total Thickness or Flange Thickness: Plus 1/4 inch, minus 1/8 inch.
 - 4. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or minus 1/8 inch/72 inches or 1/2 inch total, whichever is greater.
 - 5. Bowing: Plus or minus L/360, maximum 1 inch.
 - 6. Local Smoothness: 1/4 inch/10 feet.
 - 7. Warping: 1/16 inch/12 inches of distance from nearest adjacent corner.
- B. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.
 - 1. Handling Devices: Plus or minus 3 inches.
 - 2. Reinforcing Steel and Welded Wire Reinforcement: Plus or minus 1/4 inch where position has structural implications or affects concrete cover; otherwise, plus or minus 1/2 inch.

2.11 FINISHES

- A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units in texture and color as selected by Architect from manufacturer's full line of available colors and textures.

1. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
- B. Finish unexposed surfaces of architectural precast concrete units with as cast finish.

2.12 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
- B. Defective Units: Discard and replace recast architectural concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting structural frame and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.
- B. Do not install precast concrete units until supporting steel or other structure is structurally ready to receive loads from precast concrete units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.
- B. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
 1. Install temporary steel or plastic spacing shims as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 3. Unless otherwise indicated, maintain uniform joint widths of 3/4 inch.

- C. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff dry-pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

3.3 ERECTION TOLERANCES

- A. Erect architectural precast concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

3.4 REPAIRS

- A. Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.
- C. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.5 CLEANING

- A. Clean exposed surfaces of precast concrete units after installation and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

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. Non-shrink grout.

- B. Key Abbreviations include the following:

- 1. BF Brace Frame
- 2. HSS Hollow Structural Section
- 3. PL Steel Plate
- 4. SSF Structural Steel Framing
- 5. WF Wide Flange

- C. Related Requirements:

- 1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
- 2. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
- 3. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and other steel items not defined as structural steel.

- D. Structural Notes: The content of the "General Structural Notes" takes precedent over any contradictory portion of this Section.

- 1. In the event of discrepancies between design drawings and specifications, the design drawings govern.

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."
- B. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

- C. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" on Drawings.

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.
- C. Coordinate schedule with other trades where attachments or interference occur.
- D. Schedule and sequence fabrication to coordinate with installation schedules and progress schedules.

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. Submit Shop Drawings and Erection Drawings prior to the start of fabrication.
 - 2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 3. Include embedment Drawings.
 - 4. 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.
 - 5. Indicate locations and dimensions of protected zones.
 - 6. Identify demand critical welds.
 - 7. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 - 8. Verify all dimensions and correlate work with adjoining work.
 - 9. Indicate all erection connections and accessories required.
 - 10. Indicate size, type, grade, profiles, spacing, and location of all members, openings, and attachments.
 - 11. Indicate cambers.
 - 12. Indicate surface preparation, finishes, and shop primer.
 - 13. Show piece mark number on the erection drawings.
- C. Template Drawings and Placement Plans: As required for satisfactory placing, connection, and anchorages.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer and fabricator demonstrating compliance with the requirements of the "Quality Assurance" Article. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified
- B. Retain "Welding certificates" Paragraph below if retaining "Welding Qualifications" Paragraph in "Quality Assurance" Article.
- C. Welding certificates.
- D. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
 - 1. Structural steel including chemical and physical properties.
 - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 3. Direct-tension indicators.
 - 4. Tension-control, high-strength bolt-nut-washer assemblies.
 - 5. Weld filler metal for both shop and field-welds.
 - 6. Shop primers.
 - 7. Nonshrink grout.
- E. Source quality-control reports.
- F. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Minimum of five (5) years' experience in structural steel fabrication, including involvement in not less than three (3) projects of similar, or greater, size and complexity.
- B. Installer/Erector Qualifications: A qualified installer/erector with sufficient personnel and a minimum of five (5) years' experience with successfully completed structural steel work in similar complexity to this project.
- 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. In addition, all welders performing shop or field-welding of structural steel members shall be WABO certified, or equivalent, as accepted by the Structural Engineer and Building Official.
 - 1. Power source (constant current or constant voltage).
 - 2. Electrode manufacturer and trade name, for demand critical welds.
- D. 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."

- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

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 STRUCTURAL-STEEL MATERIALS (SSF), (HSS), (WF), (PL), (BF)

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Structural Steel Shapes, Plates, Angles, Bars, and Rods: As specified in General Structural Notes.
- C. Welding Electrodes: Comply with AWS requirements and General Structural Notes.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Finish at interior locations: Plain, uncoated.
 - 2. Finish at exterior locations: Hot-dip zinc coating, ASTM A 153, Class C (nuts shall conform to ASTM A 563 heavy hex, grade DH).
- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: Shall be approved self-load indicating types (Bethlehem Indicator Bolts, LeJeune Tension Control Bolts, etc.) and shall be installed in strict accordance with manufacturer's instructions. See General Structural Notes for required preparation of faying surfaces at slip-critical connections.

- C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- D. Anchor Rods or Anchor Bolts: ASTM 1554, Grade 36, unless otherwise noted. ASTM F 1554, Grade 55 (weldable) or Grade 105 shall be used where specifically indicated on drawings.
 - 1. Configuration: Hooked, except use straight rods where specified on drawings with double nuts at embedded ends.
 - 2. Nuts: ASTM A 563 hex, Grade A, carbon steel nuts for Grade 36 rods up to 1-1/2 inches in diameter, unless otherwise noted. In accordance with ASTM F 1554 recommendations for other rod sizes and grades, unless otherwise noted.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel, minimum size in accordance with Table 14-2 of AISC Steel Construction Manual (14th Edition) unless otherwise noted.
 - 4. Finish at interior locations: Plain, uncoated.
 - 5. Finish at exterior locations: Hot-dip zinc coating, ASTM A 153, Class C.
- E. Threaded Rods: ASTM A 307, Grade A, unless otherwise noted.
 - 1. Nuts: ASTM A 563 hex, Grade A, carbon steel.
 - 2. Washers: ASTM F 436, Type 1, hardened or ASTM A 36/A 36M carbon steel.
 - 3. Finish at interior locations: Plain, uncoated.
 - 4. Finish at exterior locations: Hot-dip zinc coating, ASTM A 153 Class C.
- F. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
- G. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- H. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.
- I. Threaded Studs: ASTM A 108, type CPL or CFL Threaded Studs by Nelson Stud Welding Division, TRW Assemblies and Fasteners Group, or equivalent.
- J. Deformed Bar Anchors: ASTM A 496, type D2L Deformed Bar Anchors by Nelson Stud Welding Division, TRW Assemblies and Fasteners Group, or equivalent.
- K. Couplers: ASTM A 194 or ASTM A 563, size and grade as required to develop full tensile strength of connected materials. Couplers shall be used at locations where specified on drawings or where approved by the Structural engineer.
- L. Couplers: ASTM A 194 or ASTM A 563, size and grade as required to develop full tensile strength of connected materials. Couplers shall only be used at locations where specified on drawings or where approved by the Structural Engineer.

2.3 PRIMER

- A. Low-Emitting Materials: Paints and coatings shall comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Primer: Use below or approved equal by the Architect.

1. Primer: Fabricator's standard Lead-free and Chromate-free, non-asphaltic, rust-inhibiting primer.
 2. Shop-applied Zinc-Rich Primer (for steel not galvanized and exposed to weather in its final position, including all AESS, and as otherwise specified): Shop preparation shall be SSPC Method SP-6.
 - a. Approved Products: "Tnemec-Zinc 90-70" by Tnemec Company, or 'Zinc Clad III HS B69A100/B69V100/B69D11" by Sherwin Williams. (MPI#19).
- C. Galvanizing Repair Paint: Organic cold-galvanizing compound having a minimum of 94% zinc dust in dry film.
1. Approved Products: "Tnemec-Zinc 90-70" by Tnemec Company, or 'Zinc Clad III HS B69A100/B69V100/B69D11" by Sherwin Williams.

2.4 NON-SHRINK GROUT

- A. Cement Grout: See "General Structural Notes". Shrinkage-Resistant, 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. Minimum compressive strength 6000 psi.

2.5 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. Fabricate for delivery in a sequence that will expedite erection and minimize field handling of structural steel.
 6. 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 3, "Power Tool Cleaning."

- F. 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.
- 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.

2.6 DIMENSIONAL TOLERANCES

- A. Fabrication Tolerances: Unless otherwise noted, fabricate structural members to referenced AISC Specifications for allowable tolerances. Do not camber in excess of amounts shown on drawings.
 - 1. Straightness: Structural members of a single rolled shape or built-up structural member shall be straight within the tolerances allowed for wide flanged shapes by ASTM A 6.
 - 2. Length: With both ends finished for contact bearing, maximum variation of overall length equals 1/32-inch. For members without ends finished for contact bearing, maximum length variation equals 1/16-inch for lengths up to 30 feet and 1/8-inch for members over 30 feet long.

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: Pretensioned, unless otherwise indicated.
- 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.

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.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Galvanized surfaces.
- 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. Typical Shop Primed Steel:
 - a. SSPC-SP 2, "Hand Tool Cleaning."
 2. Architecturally Exposed Structural Steel:
 - a. SSPC-SP 3, "Power Tool Cleaning."
 - b. SSPC-SP 7/NACE No. 4, "Brush-off Blast 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. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

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. Galvanize lintels, shelf angles and exposed exterior steel.
 3. Galvanize other members where specified in the drawings.

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.
 2. Testing Agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
 3. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
 4. Additional testing, at contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/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. 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.
- 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. Erection stability procedures shall comply with OSHA Regulation 29 CFR Part 1926 Subpart R – Steel Erection, published January 18, 2001. Miscellaneous plates for guying cable attachments, temporary joist bracing, etc. shall be added as required. Contractor shall evaluate columns and provide adequate base plate shims, guys, or temporary bracing as required per OSHA section 1926.755.
 - 2. Do not remove temporary shoring supporting composite deck construction, if required, 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, Bearing Plates and Leveling Plates: 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. Fasten splices of compression on members after bringing abutting surfaces completely into contact.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M. Cutting will be permitted only on secondary members which are not under stress, as acceptable to the Engineer.
- 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.
- I. Reaming: Light drifting will be permitted to draw the parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done by reaming with twist drills, care being taken not to weaken the adjoining metal. If, in the judgement of the Engineer/Architect, the extent of the reaming is such that holes cannot be properly filled or accurately adjusted after reaming, the faulty member shall be discarded and replaced with a new one, and all costs and expenses resulting there from shall be paid for by the Contractor.
 - 1. Do not enlarge unfair holes in members by burning or using drift pins.
- J. Cutting and Fitting: No cutting of sections, either flanges, webs, stems or angles shall be done by the Contractor without the consent of the Engineer/Architect, unless this cutting is particularly specified or shown on the drawings.
- K. Touch-up Painting: Immediately after erection, clean field welds, bolted connections and abraded areas of the shop paint. Apply paint to exposed areas with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- L. Touch-up and repair of Galvanizing: Immediately after erection, clean and repair any damaged galvanizing as outlined in previous section regarding galvanizing.
- M. Fire retardant blankets shall be employed to completely contain arcs and spatter associated with welding during erection.
- N. Weld dams shall not be used.

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.
- 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, back gouge, and grind steel smooth where indicated or where connections will be exposed to view.
 - 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.
 - 4. Remove backing bars or runoff tabs, back gouge, and grind steel smooth where indicated or where connections will be exposed to view.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds, high-strength bolted connections, and erection procedures and prepare test reports in accordance with IBC Chapter 17 and the Statement of Special Inspections in the General Structural Notes.
 - 1. Provide testing agency with access to places where structural steel work is being erected to perform tests and inspections.
- B. Bolted Connections: Bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: In addition to visual inspection, field-welds will be tested according to AWS D1.1 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 will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents. At the Owner's option, the cost of additional testing performed to determine compliance of corrected work may be at the Contractor's expense.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded or damaged surfaces of galvanized items and apply galvanizing repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Below Grade Coating: Apply heavy coat of Kopper's Bitumastic No. 50 to that portion of column, base plate, and anchor bolts below grade where not protected by minimum 3" of concrete cover on all sides.
- C. 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.

END OF SECTION 051200

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 architecturally exposed structural-steel (AESS).
 - 1. Requirements in Section 051200 "Structural Steel Framing" also apply to AESS.
- B. Key Abbreviations include the following:
 - 1. AESS Architecturally Exposed Structural Steel

1.3 DEFINITIONS

- A. AESS: Provide at all exposed stair and railing components and at exposed structural steel or fabrications, within reach to touch or can be viewed in close proximity within 10 feet upon completion of the project. Typical conditions are designated as "AESS" in the Contract Documents. Conform to the requirements of this Section for all exposed structural steel and fabrications whether specifically identified or not.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
 - 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. Indicate grinding, finish, and profile of welds.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation of bolt heads.
 - 5. Indicate exposed surfaces and edges and surface preparation being used.
 - 6. Indicate special tolerances and erection requirements.

1.5 QUALITY ASSURANCE

- A. Comply with Quality Assurance requirements of Section 051200, "Structural Steel Framing".

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage. 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.

1.7 FIELD CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 BOLTS, CONNECTORS, AND ANCHORS

- A. Refer to Section 051200, "Structural Steel Framing".

2.2 FILLER

- A. Filler: Polyester filler intended for use in repairing dents in automobile bodies.

2.3 PRIMER

- A. Low-Emitting Materials: Paints and coatings shall comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Primer: Use below or approved equal by the Architect.
 - 1. Primer: Fabricator's standard Lead-free and Chromate-free, non-asphaltic, rust-inhibiting primer.
 - 2. Shop-applied Zinc-Rich Primer: Shop preparation shall be SSPC Method SP-6.
 - a. Approved Products: "Tnemec-Zinc 90-70" by Tnemec Company, or 'Zinc Clad III HS B69A100/B69V100/B69D11" by Sherwin Williams. (MPI#19).

- C. Galvanizing Repair Paint: Organic cold-galvanizing compound having a minimum of 94% zinc dust in dry film.
 - 1. Approved Products: "Tnemec-Zinc 90-70" by Tnemec Company, or 'Zinc Clad III HS B69A100/B69V100/B69D11" by Sherwin Williams.
- D. Etching Cleaner for Galvanized Metal: MPI#25.
- E. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.4 FABRICATION

- A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
- B. In addition to special care used to handle and fabricate AESS, comply with the following:
 - 1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 - 2. Where within 6-feet of an accessible floor area, grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
 - 3. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 - 4. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 - 5. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates unless otherwise noted.
- C. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for AESS.
- D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- E. Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- F. 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.

2.5 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: Pretensioned.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
 2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
 3. Provide continuous welds of uniform size and profile where AESS is welded.
 4. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero.
 5. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
 6. At locations where welding on the far side of an exposed connection of AESS, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
 7. Make fillet welds of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

2.6 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. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

2.7 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.
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Galvanized surfaces.
- B. Surface Preparation for Nongalvanized Steel: 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 3, "Power Tool Cleaning."
 2. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 3. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

- D. 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. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

3.1 ERECTION

- A. Set AECS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Do not use thermal cutting during erection.

3.2 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: Pretensioned.
 - 2. Orient bolt heads in same direction for each connection and to maximum extent possible in same direction for similar connections.
- B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
 - 1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.
 - 2. Remove erection bolts, fill holes, and grind smooth.
 - 3. Fill weld access holes and grind smooth.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AECS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AECS in place to determine acceptability relating to aesthetic effect.

3.4 REPAIRS AND PROTECTION

- A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 051213

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. LH- and DLH-series long-span steel joists.
 - 2. Joist accessories.
- B. Key Abbreviations include the following:
 - 1. STLJ Steel Joist
- C. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for installing bearing plates in concrete.
 - 2. Section 051200 "Structural Steel Framing" for field-welded shear connectors.

1.3 DEFINITIONS

- A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders", latest edition.
- B. Joists: Refers to all items listed above unless otherwise noted.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated. Include product data for primer at prime painted joists.
- B. Shop Drawings: Show layout, designation, number, type, location, and spacing of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction. Indicate locations and details of bearing plates to be embedded in other construction.
 - 1. Comprehensive structural calculations of joists signed and sealed by the qualified professional engineer responsible for their preparation shall be submitted to the Architect and Structural Engineer for review prior to joist fabrication.
 - 2. Shop drawings and structural calculations shall also be submitted to the Building Official for review as required.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Manufacturer certificates. Signed by manufacturer certifying that joists comply with requirements.
- C. Mill Certificates: For each type of bolt.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."
 - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of joists that are similar to those indicated for this Project in material, design and extent.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

- A. Deliver steel bearing plates to be built into cast-in-place concrete construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Structural Performance: Provide joists capable of withstanding design loads indicated on the Structural Drawings.

- C. Unless otherwise indicated, design joists to withstand design loads with live load deflections no greater than the following:

- 1. Simple Span Roof Joists: Vertical deflection of $L/360$ of the span.

2.2 LONG-SPAN STEEL JOISTS (STLJ)

- A. Steel Joists: Type as indicated on the Structural Drawings.
- B. Manufacture steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated.
- C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting work.
- D. Provide holes in chord members for connecting and securing other construction to joists.
- E. Camber joists according to SJI's "Specifications", unless otherwise indicated.
- F. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.
- G. Provide bolted bearing seat connections at or near steel columns in accordance with the General Structural Notes and in compliance with OSHA Regulation 29 CFR Part 1926 Subpart R – Steel Erection, published January 18, 2001. Coordinate bolt size and spacing with structural steel fabricator.
- H. Provide bottom chord extensions where required for erection stability or where required to support architectural items. Coordinate stabilizer plates required at steel columns with structural steel fabricator.

2.3 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.4 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability. Coordinate bridging layout with mechanical duct routing and other miscellaneous items prior to joist erection.
- B. Steel bearing plates with integral anchorages are specified in Section 055000 "Metal Fabrications."

- C. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated. Also provide bottom chord extensions where required for erection stability. Coordinate stabilizer plates required at steel columns with structural steel fabricator.
- D. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly and installation.
- E. Shop install or design and provide installation details of all field installed web members needed to support miscellaneous point loads on the Structural Drawings which do not occur at joist panel points.
- F. Provide bolted bearing seat connections at or near steel columns in accordance with the General Structural Notes and in compliance with OSHA regulation 29 CFR Part 1926 Subpart R – Steel Erection, published January 2001. Coordinate bolt size and spacing with structural steel fabricator.

2.5 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Apply one coat of shop primer.
- C. Do not prime paint joists and accessories to receive sprayed fire-resistive materials or joists entirely concealed to view upon completion of the project.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing 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

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.

3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.
- C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts.
- E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
- F. Do not drill or cut holes in joist members in the field without written approval from the Structural Engineer and joist manufacturer.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test inspection reports.
- B. Field welds will be visually inspected according to AWS D1.1/D1.1M.
1. In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable:
 - a. Liquid Penetrant Inspection: ASTM E 165/E 165M.
 - b. Magnetic Particle Inspection: ASTM E 709.
 - c. Ultrasonic Testing: ASTM E 164.
 - d. Radiographic Testing: ASTM E 94.
- C. Bolted connections will be visually inspected.
- D. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- E. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2 or power-tool cleaning according to SSPC-SP 3.
 2. Apply a compatible primer of same type as primer used on adjacent surfaces.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 052100

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.
 - 2. Composite floor deck.
- B. Key Abbreviations include the following:
 - 1. CSFD Composite Steel Floor Deck
 - 2. FCS Flexible Closure Strip
 - 3. SRD Steel Roof Deck
- C. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for concrete fill over steel deck.
 - 2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
 - 3. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
 - 4. 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. Signed by product manufacturer.
- 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.

D. Evaluation Reports:

1. ICC-ES Research/Evaluation Reports: For steel deck as evidence of steel deck's compliance with the International Building Code 2015.

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. 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."

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. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services, "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Minimum deck gages are shown on the Drawings and are based on unshored conditions. Heavier deck gage may be required for conditions other than these, depending on the Manufacturer's layout and contractor's layout. Deck supplier shall verify deck gages and capacities based on actual deck layout and span condition. Deviations in deck gages from those shown shall be submitted to the architect, along with a valid ICC report, prior to shop detailing.

2.2 ROOF DECK (SRD)

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. ASC Profiles, Inc.
 - 2. Verco Decking, Inc., a Nucor company.
- B. 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. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), G60 zinc coating.
 - 2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer for use at locations where roof deck is exposed to view.
 - 3. Deck Profile: As indicated.
 - 4. Profile Depth: 1-1/2 inch.
 - 5. Span Condition: As indicated.
 - 6. Design Uncoated-Steel Thickness: As indicated.
 - 7. Side Laps: Interlocking seam.

2.3 COMPOSITE FLOOR DECK (CSFD)

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. ASC Profiles, Inc.
 - 2. Verco Decking, Inc., a Nucor company.
- B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 - 2. Profile Depth: As indicated.
 - 3. Design Uncoated-Steel Thickness: As indicated.
 - 4. Span Condition: As indicated.
 - 5. Side Laps: Interlocking seam.

2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners (if used): Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

- C. Flexible Closure Strips (FCS): Vulcanized, closed-cell, synthetic rubber.
- D. Exterior Wall Closure: Steel sheet of same material, finish and thickness as deck unless otherwise indicated. Provide at all locations where steel deck extends over exterior walls, except at locations concealed within soffits. Fabricate to conform to deck profile and fit tightly into deck flutes without gaps or openings exceeding 1/16 inch in width.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.
- G. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747-inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- I. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- J. Flat Sump Plates: Single-piece steel sheet, 0.0747-inch thick, of same material and finish as deck. For drains, cut holes in the field.
- K. Recessed Sump Pans: Single-piece steel sheet, 0.0747-inch thick, of same material and finish as deck, with 3-inch-wide flanges and level or sloped recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- L. Galvanizing Repair Paint: ASTM A 780/A 780M SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.
- M. 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 only if approved by the Architect and Engineer via a substitution request, including an approved ICC-ES report listing equivalent diaphragm capabilities. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF-DECK

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
 - 1. Weld Diameter: 1/2" diameter effective.
 - 2. Weld Spacing: To all supports, both parallel and perpendicular to the deck flutes, as indicated on Structural Drawings.
 - 3. Weld Washers: Where required, install weld washers at each weld location.
- B. Side-Lap Fastening: Button punch, mechanically clinch, or weld with 1-1/2-inch long top seam or side seam welds, as indicated on Structural Drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints lapped 2 inches.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck.
 - 1. Install steel angle supporting frame below in accordance with Structural Drawings.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to Drawings and deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

- 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 INSTALLATION OF FLOOR-DECK

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: $\frac{1}{2}$ " diameter effective.
 - 2. Weld Spacing: To all supports, both parallel and perpendicular to the deck flutes, as indicated on Structural Drawings. Where field installed headed shear studs occur, each stud is allowed to replace one puddle weld location.
 - 3. Weld Washers: Where required, install weld washers at each weld location.
- B. Side-Lap Fastening: Mechanically fasten side laps of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, unless otherwise specified.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with butted end joints.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck. Cut out closure pieces where they coincide with a headed shear stud placed at a deck low flute to allow concrete to fully surround the stud.
- F. Install piercing hanger tabs such that slots are parallel to the deck flutes only.

3.5 REPAIR

- 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.

3.6 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.
- D. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- E. Remove and replace work that does not comply with specified requirements.
- F. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

END OF SECTION 053100

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. Exterior non-load-bearing wall framing.
 - 2. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.
 - 3. Soffit framing.
- B. Key Abbreviations include the following:
 - 1. BLKG Blocking
 - 2. CFMF Cold-Formed Metal Framing
 - 3. FC Furring Channels
 - 4. SSG Sill Sealer Gasket
- C. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes and connections used with cold-formed metal framing.
 - 2. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.

- D. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- E. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- C. Component Design: Calculate structural properties of studs in accordance with American Iron and Steel Institute (AISI) "Specification for Design of Cold-Formed Steel Structural Members, Latest Edition."
- D. Welding: Use qualified welders and comply with American Welding Society (AWS) D1.3, "Structural welding Code Sheet Steel."
- E. Fire Rated Assemblies: Where framing units are components of assemblies indicated for a fire resistance rating, including those required for compliance with governing regulations, provide units that have been approved by governing authorities that have jurisdiction.
- F. Pre-installation Conference: Prior to start of installation of metal framing systems, meet at project site. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing Work.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation and other damage during delivery, storage and handling.
- B. Store cold-formed metal framing, protected with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal only from the manufacturers that are current members of the Steel Stud Manufacturer's Association (SSMA).
- B. Available Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. AllSteel & Gypsum Products, Inc.
 - 2. CEMCO; California Expanded Metal Products Co.
 - 3. ClarkDietrich Building Systems.
 - 4. Consolidated Fabricators Corp.; Building Products Division.
 - 5. SCAFCO Steel Stud Company.
 - 6. Steel Construction Systems.
 - 7. Steeler, Inc.
 - 8. United Metal Products, Inc.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 - 1. Grade ST33H: For 18 and 20 gauge sections.
 - 2. Grade ST50H: For 16, 14 and 12 gauge sections.
 - 3. Coating: G60, A60, AZ50, or GF30 typical.
- B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As indicated on Structural Drawings.
 - 2. Coating: G90.

2.3 WALL FRAMING (CFMF)

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated.

- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, as indicated on the Structural Drawings. ClarkDietrich joist headers as indicated on structural drawings where occurs.
- D. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ClarkDietrich Building Systems.
 - b. SCAFCO Steel Stud Company.
 - c. Steel Network, Inc. (The).
- E. Single Deflection Track: Manufacturer's standard U-shaped steel track; unpunched, with unstiffened flanges, of web depth as indicated. Base-metal thickness and flange width as noted on Structural Drawings. Slotted leg deflection tracks shall not be used.
- F. Drift Clips: As Indicated on Structural Drawings.

2.4 FLOOR AND ROOF JOIST FRAMING (CFMF)

- A. Steel Joist Sections: Manufacturer's standard C-shaped steel joists, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated.
 - 3. Where indicated provide sections with manufacturer's standard enlarged service holes.
- B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: As indicated.
 - 2. Flange Width: As indicated.
 - 3. Where indicated provide sections with manufacturer's standard enlarged service holes.

2.5 EXTERIOR SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, as indicated on the Structural Drawings.

2.6 FRAMING ACCESSORIES (BLKG), (FC)

- A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Stud kickers and knee braces.
 - 8. Joist hangers and end closures.
 - 9. Hole-reinforcing plates.
 - 10. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: As specified in Section 051200 "Structural Steel framing."
- C. Expansion Anchors: As specified in General Structural Notes.
- D. Power-Actuated Anchors: As specified in General Structural Notes.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: MIL-P-21035B or SSPC-Paint 20.
- B. Cement Grout: Portland cement, ASTM C 150/C 150M, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1-part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C 1107/C 1107M, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sealer Gaskets (SSG): Closed-cell neoprene foam, 1/4-inch thick, selected from manufacturer's standard widths to match width of bottom track members.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete construction.
- B. Install sealer gaskets at the underside of wall bottom track and at the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

- H. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- C. Fasten both flanges of studs to bottom track, unless otherwise indicated where clip angles are specified. Space studs as indicated on Drawings.
- D. Isolate non-load-bearing steel framing from building structure as indicated to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks without slotted legs and anchor to building structure where indicated at tops of walls.
 - 2. Where indicated, connect vertical deflection clips to bypassing studs or to infill studs below and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Drawings. Fasten at each stud intersection.
 - 1. Install row of horizontal bridging within 18 inches of single deflection track at tops of walls. Alternately, temporary screws may be installed to attach each stud flange to the deflection track prior to installation of sheathing on each side of the wall. Temporary screws must be removed as sheathing is installed, and sheathing shall not be screwed into the deflection track.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 FLOOR AND ROOF JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
 - 1. Install joists over supporting frame with a minimum end bearing as indicated.
 - 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Drawings.
 - 3. Space joists as indicated.
- C. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists as indicated.

- D. Install bridging at intervals indicated on Drawings. Fasten bridging at each joist intersection as follows:
 - 1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
 - 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated, and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- E. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- F. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.5 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 054000
COLD-FORMED METAL FRAMING

END OF SECTION 054000

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. Miscellaneous steel framing and supports.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
3. Miscellaneous related items including fasteners, connectors, and other items required for complete installation of metal fabrication-type items.
4. Steel framing and supports for stairs and landings.
5. Steel framing, infill and supports for railings and handrails.
6. Steel framing and support for mechanical and electrical equipment.
7. Elevator hoist beams.
8. Steel shapes for supporting elevator door sills.
9. Metal ladders.
10. Metal ships' ladders.
11. Elevator pit sump covers.
12. Miscellaneous steel trim.
13. Metal bollards.
14. Loose bearing and leveling plates.
15. Steel vehicular gates.

- B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

- C. Key Abbreviations include the following:

- | | | |
|-----|------|---------------------------------|
| 1. | BOL | Bollard |
| 2. | BTP | Bent Plate |
| 3. | EXPA | Expansion Anchor |
| 4. | FAA | Fall Arrest Anchors |
| 5. | HSS | Hollow Structural Section |
| 6. | MBG | Metal Bar Grating |
| 7. | MMF | Miscellaneous Metal Fabrication |
| 8. | NSG | Non-Shrink Grout |
| 9. | PL | Steel Plate |
| 10. | PMP | Perforated Metal Panel |

- | | | |
|-----|-------|------------------------------|
| 11. | SAL | Steel Access Ladder |
| 12. | SFS | Steel Framed Stair |
| 13. | SGATE | Steel Vehicular Gate |
| 14. | SPL | Ship's Ladder |
| 15. | SPR | Steel Pipe Railing |
| 16. | SPRB | Steel Pipe Railing Brackets |
| 17. | SSPR | Stainless Steel Pipe Railing |

D. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Section 051200 "Structural Steel Framing."

1.3 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 metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B. Delegated-Design Submittal: For ladders, railings and stairs, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Welding certificates.
- C. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing decorative metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design ladders and stairs.
 - 1. Conform to code and OSHA requirements.
- B. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
- D. Refer to General Structural Notes for requirements of all metals and connections shown on structural drawings.

2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars (PL), (BTP): ASTM A 36/A 36M.
- B. Steel Tubing (HSS): ASTM A 500/A 500M, cold-formed steel tubing.
- C. Steel Pipe (SPR): ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.4 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 304.
- B. Pipe (SSPR): ASTM A 312/A 312M, Grade TP 304.
- C. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.
- D. Bars and Shapes: ASTM A 276, Type 304.
- E. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304

2.5 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.6 FASTENERS (FSN)

- 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, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Fasteners for Interconnecting Stainless Steel Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
 - 2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated

- C. Anchor Bolts (AB): 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.
- D. 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/E 488M, conducted by a qualified independent testing agency.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Screws: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1
- K. 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. Refer to General Structural Notes.
- L. Post-Installed Anchors (EXPA): Torque-controlled expansion anchors or chemical anchors. Refer to General Structural Notes.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.7 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Field Repairs: Provide 2 gallons of interior primer and 2 gallons of exterior primer for repair in the field by erector.
- 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/D 1187M.

- E. Nonshrink, Nonmetallic Grout (NSG): Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.8 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- I. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- J. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.9 MISCELLANEOUS FRAMING AND SUPPORTS (MMF)

- 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.
- C. Galvanize miscellaneous framing and supports installed in exterior locations, unless noted otherwise.
- D. Prime miscellaneous framing and supports with zinc-rich primer at all locations except where indicated to be galvanized.
- E. Provide elevator door sill angles as required by elevator manufacturer.

2.10 STEEL FRAMED STAIRS (SFS)

- A. See Drawings for requirements regarding the design and fabrication of steel stairs.
- B. Bidder Design:
 - 1. Main framing members indicated on the structural Drawings and their connections to the primary structural frame have been designed by the structural engineer of record.
 - 2. Structural design of secondary framing members and their connection to main framing members and other adjacent products is the responsibility of the steel fabricator.
 - a. Stair connections shall be designed and detailed to allow 0.15*H (inches) of horizontal movement in each direction (by means of slotted holes or other similar method).
 - b. Shop drawing for steel framed stairs shall be designed and stamped by a structural engineer licensed in the State of Washington.
- C. General: Construct stairs to conform to sizes and arrangements indicated, join pieces together by shop welding and field bolting unless otherwise indicated. Provide complete stair assemblies including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates and other components necessary for the support of stairs and platforms and as required to anchor and contain the stair on the supporting structure. Fabricate all pieces in complete sections with guardrail and handrail attached as required by the erector to fit site conditions and accessibility.
- D. Stair Framing: Fabricate stringers of structural steel framing members, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel framing members as indicated. Bolt or weld headers to stringers and newels and framing members to stringers and headers; fabricate and join so bolts, if used, do not appear on finish surfaces, unless otherwise indicated.
- E. Metal Pan Risers, Treads, and Platforms: Shape metal pans for risers to conform to configuration shown. Provide thickness of structural steel sheet and/or grating for metal risers indicated but not less than that required to support total design loading.

1. Form metal pans of cold-rolled carbon steel sheet unless otherwise indicated.
2. Fasten risers to treads and stringers as indicated.
3. Attach to stringers by means of brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding.

- F. Stair Railings and Handrails: Comply with applicable requirements specified elsewhere in this section for steel pipe railings.

2.11 STEEL PIPE RAILINGS, HANDRAILS AND BRACKETS (SPR), (SPRB)

- A. Tubing: ASTM A 500 (cold formed).
- B. Pipe: ASTM A 53/A 53M. Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- C. Finish: Galvanized finish at all exterior installations.
- D. Fabricate steel pipe railings and handrails to design dimensions, and details indicated. Provide railings and handrail members formed of pipe and tubes of sizes and wall thickness indicated but not less than that required to support design loading.
1. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricators option.
 2. At tee and cross intersections, provide coped joints.
 3. At bends, interconnect pipe by means of prefabricated elbow fittings of radiuses indicated.
 4. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.
 5. Provide wall returns at ends of wall-mounted handrails, except where otherwise indicated.
 6. Close ends of pipe by welding 3/16" thick steel plate in place.
- E. Brackets, Flanges, Fittings and Anchors: Provide brackets, end closures, flanges, miscellaneous fittings and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.
1. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- F. For railing posts set in concrete, provide steel sleeves not less than 6-inches long with inside dimensions 1/2-inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.12 STAINLESS STEEL PIPE RAILINGS, HANDRAILS, AND BRACKETS (SSPR)

- A. Pipe: ASTM A 312/A 312M, Grade TP304, typical 1-1/2-inch O.D.

- B. Plate & Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
- C. Finish:
 - 1. Pipe: 180-Grit polished finish. Uniform, directionally textured finish.
 - 2. Sheet and Plate: Directional satin finish, ASTM A 489/A 480, No. 4.
- D. Fabricate stainless steel handrails to design dimensions, and details indicated. Provide handrail members formed of pipe of sizes and wall thickness indicated but not less than that required to support design loading.
 - 1. At tee and cross intersections, provide coped joints.
 - 2. At bends, interconnect pipe by means of prefabricated elbow fittings of radiuses indicated.
 - 3. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.
 - 4. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - a. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
 - 5. Provide wall returns at ends of wall-mounted handrails, except where otherwise indicated.
 - 6. Close ends of pipe.

2.13 PERFORATED METAL PANEL (PMP)

- A. General: Cut to shapes, size and configuration as shown on the drawings. McNichols; Item #16206322M2, or approved substitute. Provide with finished end margin, as detailed, at all perimeter edges except field welded panel joints.
- B. Perforated Metal: Slotted, Carbon Steel, Cold Rolled, Mill Finish, 22-gauge, Square-End Slot, Straight Centers, 71% Open Area.
- C. Location: Low wall supply grille at rear of Platform 116. Refer to Sheet A4.44 for details.
- D. Finish: Powder-coated finish. Color as selected by Architect.
- E. Submit shop drawings for review and approval prior to fabrication.

2.14 METAL LADDERS (SAL)

- A. General:
 - 1. Comply with ANSI A14.3.
 - 2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Access Ladders:

1. Space siderails 16 inches for elevator pit and 24 inches at all other locations unless otherwise indicated.
2. Siderails: Continuous 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch 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.
6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
7. Galvanize ladders, including brackets.

2.15 METAL SHIPS' LADDERS (SPL)

A. Provide metal ships' ladders with handrail at locations indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.

1. Treads shall be not less than 6 inches exclusive of nosing or less than 8-1/2 inches including the nosing, and riser height shall be not less than 9-1/2 inches or greater than 12 inches.
2. Fabricate ships' ladders, including railings from aluminum.
3. Fabricate treads from extruded aluminum with serrated slip resistance surface.
4. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted aluminum brackets.
5. Fabricate 1-1/4-inch, schedule 40 aluminum pipe handrails provided with internal aluminum fittings.
6. Provide ladder safety post attached to one side of ladder to assist the climber in entering or exiting the top of ladder.
7. Finish: Mill finish.

2.16 METAL BAR GRATING (MBG)

A. Elevator sump grate and support angles at elevator pit sump:

1. McNichols rectangular bar, galvanized GW-150 smooth, steel welded grating fabricated with bearing bars spaced at 1-3/16-inches on center and cross bars spaced at 4-inches on center. Provide steel support angles at each end of grate, size 1 1/2" x 1 1/2" x 3/16", secure angles to concrete sump walls with a minimum of three 1/4" expansion anchors. Set top of grate flush with top of elevator pit slab.

2.17 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.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim.

2.18 METAL BOLLARDS (BOL)

- A. Fabricate metal bollards from galvanized Schedule 40 steel pipe as detailed from sizes and shapes indicated. Fill with concrete. Do not paint.

2.19 STEEL VEHICULAR GATES (SGATE)

- A. Fabricate steel gates as detailed from sizes and shapes indicated. Galvanize assembly after fabrication. Do not paint.

2.20 FALL PROTECTION (ARREST) ANCHORS (FAA)

- A. Galvanized steel roof fall protection anchors: Hot-dipped galvanized steel post (HSS or steel pipe) conforming to OSHA 1910.66, filled with urethane insulation, with stainless steel eye as detailed on the structural drawings.

2.21 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.
- B. Galvanize plates for exterior use after fabrication.
- C. Prime plates with zinc-rich primer.

2.22 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.

2.23 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.24 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, or masonry, or unless otherwise indicated.
 - 1. Shop prime with universal shop primer unless zinc-rich primer is indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

2.25 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class I, Clear Anodic Finish: AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports securely to, and rigidly brace from building structure.

3.3 INSTALLING METAL BOLLARDS

- A. Anchor bollards in place with concrete footings. Center and align bollards in excavated holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- B. Fill bollards solidly with concrete, mounding top surface to shed water.

3.4 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ATTACHING HANDRAILS TO WALLS

- A. Attach handrails to wall with wall brackets. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface unless otherwise indicated on drawings.
 1. Use type of bracket with predrilled hole for expansion bolt anchorage.
- B. Locate brackets as indicated or, include additional brackets as necessary to support structural loads.
- C. Secure wall brackets to building construction into solid blocking.

3.6 REPAIRS

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

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. Downspouts
2. Plywood backing panels.
3. Rooftop curbs.
4. Wood blocking, cants, and nailers.
5. Wood furring and grounds.
6. Wood sleepers.

- B. Key Abbreviations include the following:

- | | | |
|----|------|-------------------------------------|
| 1. | BLKG | Blocking |
| 2. | DS | Downspout |
| 3. | MWD | Miscellaneous Wood |
| 4. | PPBP | Prefabricated Plywood Backing Panel |
| 5. | PTWD | Preservative Treated Wood |
| 6. | PWBP | Plywood Backing Panel |
| 7. | PWD | Plywood |

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2-inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2-inches nominal size or greater but less than 5-inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. Timber: Lumber of 5-inches nominal size or greater in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
 1. Wood-preservative-treated wood.
 2. Engineered wood products.
 3. Power-driven fasteners.
 4. Post-installed anchors.
 5. Metal framing anchors.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 3. Dress lumber, S4S, unless otherwise indicated.
 4. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sized for dry lumber.
- B. Maximum Moisture Content of Lumber: Less than 15 percent for 2-inch nominal thickness or less; less than 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER (PTWD)

- A. Preservative Treatment by Pressure Process: AWPAC U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of less than 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 PLYWOOD SPACERS, FURRING

- A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

2.4 MISCELLANEOUS LUMBER (MWD), (BLKG)

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.5 DOWNSPOUTS

- A. Downspouts (DS): Schedule 40 PVC, white 6" unless noted otherwise.
 - 1. PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785 and ASTM D 2665.
 - 2. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.
- B. Provide all fittings as shown or required for complete assembly.
- C. Neoprene Downspout Boots: Connect downspouts with neoprene downspout boot with stainless steel clamping ring to below grade tightline storm drainage system.
- D. PVC Cleanouts: Schedule 40, Tee Cleanout with threaded plug. Locate at the bottom of each downspout.
- E. Paint with industrial coating finish as specified in Section 099113 "Exterior Painting".

2.6 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels (PWBP): Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
 - 1. Provide from 4" to 8'-4" above floor, around entire perimeter of all MDF and IDF Rooms and as otherwise indicated.
 - 2. Paint finish with two coats of white latex paint.
- B. Prefabricated Plywood Backing Panels (PPBP)
 - 1. Composite plywood and metal backing panels prefabricated in 5-1/8" by 48" sections for installation between metal studs spaced 16" on center.
 - 2. Danback Type D16 as manufactured by Dietrich Metal Framing (866) 638-1908 or equal.
 - a. Provide as backing for surface mounted equipment specified in other Sections.

2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Use only expansion anchors listed in the General Structural Notes.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- C. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- D. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- E. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.

- F. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. NES NER-272 for power-driven fasteners.
- H. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- I. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. All wood blocking and nailers on roof shall be thoroughly dry prior to encapsulation with roofing membrane. Protect as required after installation. Should surface moisture occur, provide the necessary means to fully dry the material prior to roofing application.
- E. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

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. Wall sheathing.
 - 2. Floor Sheathing.
- B. Key Abbreviations include the following:
 - 1. GS Gypsum Sheathing
 - 2. PWDS Plywood Sheathing
- C. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for plywood backing panels.
 - 2. Section 072500 "Weather Barriers" for weather resistant barrier applied over wall sheathing.
 - 3. Section 075419 "Single-Ply Membrane Roofing" for coverboard and substrate board integral to roofing system.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site prior to commencement of field installation to establish procedures to maintain working conditions and to coordinate this work with related and adjacent work. Verify that sheathing details comply with manufacturer's current installation requirements and recommendations.
 - 1. Review air-barrier and water-resistant glass-mat gypsum sheathing requirements and installation, special details, transitions, mockups, air-leakage testing, protection, and work scheduling that covers air-barrier and water-resistant glass-mat gypsum sheathing.

1.4 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.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of water-resistant glass-mat gypsum sheathing.

B. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly as indicated on Drawings, incorporating backup wall construction, window, storefront, door frame and sill, ties and other penetrations, and flashing to demonstrate crack and joint treatment and sealing of gaps, terminations, and penetrations of air-barrier sheathing assembly.
2. Do not incorporate mockups into work.
3. Protect all Architect accepted mockup as standard of quality for work of this section for duration of project.

1.7 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.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

A. Glass-Mat Gypsum Sheathing (GS): ASTM C 1177/1177M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Building Products.
 - c. National Gypsum Company.
 - d. United States Gypsum Company.
2. Type and Thickness: Regular, 1/2 inch thick.
3. Size: 48 by 96 inches for vertical installation.

2.2 FLOOR SHEATHING (PWDS)

- A. Plywood Subflooring: Either DOC PS 1 or DOC PS 2, single-floor panels or sheathing.
 - 1. Span Rating: Not less than 48/24.
 - 2. Nominal Thickness: Not less than 3/4 inch.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. 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.
 - 1. For steel framing less than 0.0329-inch thick, use screws that comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112-inch thick, use screws that comply with ASTM C 954.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- D. Coordinate wall and roof 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.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

- F. 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.

3.2 GYPSUM SHEATHING 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 panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 3. Install panels with a 1/4-inch gap where they abut materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. 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 panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
- D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

END OF SECTION 061600

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. Interior standing & running trim.
2. Interior MDF wood paneling.
3. Interior wood railing caps.
4. Hardwood Veneer Plywood Paneling.

- B. Key Abbreviations include the following:

- | | | |
|----|------|------------------------------------|
| 1. | HVPP | Hardwood Veneer Plywood Paneling |
| 2. | HWD | Hardwood |
| 3. | HWDB | Hardwood Base |
| 4. | HWDR | Hardwood Railing |
| 5. | HWDT | Hardwood Trim |
| 6. | MDFP | Medium Density Fiberboard Paneling |
| 7. | MDFT | Medium Density Fiberboard Trim |

- C. Related Requirements:

1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
2. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

- A. MDF: Medium-density fiberboard.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's Board of Review. Grade lumber by an agency certified by the American Lumber Standard Committee's Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
- B. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.

2.2 INTERIOR TRIM

- A. Hardwood Lumber Trim for Transparent Finish - Stain Finish (HWD), (HWDT):
 - 1. Species and Grade: White Birch, Clear A Finish; NHLA.
 - 2. Maximum Moisture Content: 13 percent.
 - 3. Finger Jointing: Not allowed.

4. Gluing for Width: Not allowed.
5. Veneered Material: Not allowed.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

B. Hardwood Base for Transparent Finish (HWDB):

1. Species and Grade: Same as specified for interior trim.

C. Hardwood Railing for Transparent Finish (HWDR):

1. Species and Grade: Same as specified for interior trim.

D. Medium Density Fiberboard Trim (MDFT):

1. Molding for Opaque Finish (Painted): P-Grade, primed medium-density fiberboard:
 - a. Texture: Surfaced (smooth).
 - b. Dimensions as detailed.

2.3 PANELING

A. Hardwood Veneer Plywood Paneling (HVPP): Manufacturer's stock hardwood plywood panels complying with HPVA HP-1.

1. Face Veneer Species and Cut: Rotary-cut white birch.
2. Veneer Matching: Selected for similar color and grain.
3. Backing Veneer Species: Any hardwood compatible with face species.
4. Construction: Veneer core.
5. Thickness: 3/4" unless otherwise shown on Drawings.
6. Panel Size: As shown on Drawings.
7. Glue Bond: Type II (interior).
8. Finish: Stain with transparent, UV-resistant, protective finish.

B. Medium Density Fiberboard Panels (MDFP).

1. Texture: Smooth.
2. Lumber for transparent finish.
3. Thickness: 3/4"
4. Panel Sizes: As indicated on drawings.
5. Flame Spread: Class II-76-200.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

- B. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- D. Paneling Fasteners at MDF: Exposed tamper proof stainless-steel fastener and stainless-steel countersunk washer.
- E. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

2.5 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 - 1. Interior standing and running trim.
 - 2. Wood-board paneling.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 - 1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 - 2. Install trim after gypsum-board joint finishing operations are completed.
 - 3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 PANELING INSTALLATION

- A. Medium Density Fiberboard Paneling: Select and arrange panels on each wall to minimize noticeable character and color between adjacent panels. Chamfer edges with 1/8" chamfer and finish edges prior to panel installation. Space panels as indicated on the drawings. Install with uniform tight joints between panels.
 - 1. Attach panels to solid backing with tamper proof stainless-steel fastener and stainless-steel countersunk washer. Space fasteners as indicated.
 - 2. Provide blocking in wall as required for panel fastening.

3.6 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.7 CLEANING

- A. Clean interior finish carpentry on exposed and semi-exposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

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. Plastic-laminate-faced wood paneling.
 - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced wood paneling that is not concealed within other construction.
- B. Key Abbreviations include the following:
 - 1. ARP Acoustical Reflector Panel
 - 2. PLWP Plastic Laminated Wood Paneling

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that paneling can be installed as indicated.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plastic-laminate-faced wood paneling.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show details full size.
 - 3. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
- C. Samples for Verification: For each type of exposed laminate, 8 by 10 inches.
 - 1. Provide one Sample applied to core material and with specified edge material applied to one edge.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of product.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups of typical paneling as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver paneling until painting and similar operations that might damage paneling have been completed in installation areas. Store paneling in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed/concealed by construction and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where paneling 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.

PART 2 - PRODUCTS

2.1 PANELING, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-faced wood paneling (decorative laminate surfacing) indicated for construction, finishes, installation, and other requirements.

1. The Contract Documents may contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.2 PLASTIC-LAMINATE-FACED WOOD PANELING (PLWP)

- A. Grade: Custom.
- B. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3 and the following requirements:
 1. Faces: Grade VGS.
 2. Exposed Edges: ABS, thermoplastic edge banding to match face. Doelken-Woodtape or approved equal.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed surfaces complying with the following requirements:
 1. PLWP:
 - a. Color: Wilsonart; Brazilwood 7946-38
 - b. Grain Direction: Vertical on vertical surfaces. Front to back of Concert Hall on all other surfaces. Indicate direction on shop drawings for confirmation by architect.
- D. Panel Core: Particleboard or MDF.
 1. Thickness: 1/2 inch.
- E. Adhesives for Bonding Plastic Laminate: Adhesive recommended by manufacturer for intended application.

2.3 ACOUSTICAL REFLECTOR PANEL (ARP)

- A. Grade: Custom.
- B. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3 and the following requirements:
 1. Faces: Grade VGS.
 2. Exposed Edges: ABS, thermoplastic edge banding to match face at outside perimeter of panels. Edge banding to be black along field joints per 4/A5.42. Doelken-Woodtape or approved equal.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed surfaces complying with the following requirements:
 1. ARP:
 - a. Color: Wilsonart; Brazilwood 7946-38

- b. Grain Direction: Front to back of Concert Hall on all other surfaces. Indicate direction on shop drawings for confirmation by architect.

D. Panel Core: Plywood.

- 1. Thickness: 3/4 inch.

E. Adhesives for Bonding Plastic Laminate: Adhesive recommended by manufacturer for intended application.

2.4 MATERIALS

A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.

B. Composite Wood and Products: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.

- 1. MDF: ANSI A208.2, Grade 130.
- 2. Particleboard: ANSI A208.1, Grade M-2.
- 3. Straw-Based Particleboard: ANSI A208.1, Grade M-2, except for density.
- 4. Plywood: A-grade plywood.

2.5 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Fasteners: Exposed tamper proof stainless-steel fastener and stainless-steel countersunk washer.

- 1. Concealed fasteners (back-fastened per details) at Acoustical Reflector Panels (ARP)

C. Panel Hanger Clips: Aluminum Z-clip hanging system.

- 1. Two-piece interlocking assembly, similar to a French cleat, designed to attach plastic laminate faced paneling without exposed fasteners. System consisting of a shorter clip mechanically attached to back of panel and the longer continuous length attached to wall substrate.

2.6 FABRICATION

A. Complete fabrication, including assembly, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

- 1. Fabricate to size and pattern per drawings.

- B. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition paneling to humidity conditions in installation areas.
- B. Before installing paneling, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A. Grade: Install paneling to comply with quality standard grade of paneling to be installed.
- B. Install paneling level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
 - 1. For flush paneling with revealed joints, install with variations in reveal width, alignment of top and bottom edges, and flushness between adjacent panels not exceeding 1/32 inch.
- C. Anchor paneling to supporting substrate with concealed panel-hanger clips or exposed fasteners as detailed and specified.
- D. Ensure substrate surface behind plastic laminate wall paneling joints is painted matte black prior to installation.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective paneling, where possible, to eliminate defects. Where not possible to repair, replace paneling. Adjust for uniform appearance.
- B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064219

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. Cold-applied, emulsified-asphalt dampproofing.
- B. Key Abbreviations include the following:
 - 1. DMP Dampproofing

1.3 ACTION SUBMITTALS

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

1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING (DMP)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide BASF Corporation; Construction Systems, MasterSeal 610, or comparable product by one of the following:
 - 1. Approved Equal.

- B. Trowel Coats: ASTM D 1227, Type II, Class 1.
- C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
- E. VOC Content: 30g/L or less.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.
 - 1. Test for surface moisture according to ASTM D 4263.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.
- C. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections.

3.3 APPLICATION, GENERAL

- A. Application: Apply dampproofing to the following surfaces:

1. Apply at all exterior, below-grade building wall surfaces of concrete foundation walls and earth side of concrete retaining walls below grade.
- B. Comply with manufacturer's written instructions for dampproofing surface preparation, application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.
 1. Apply dampproofing to provide continuous plane of protection.
 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- C. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.
 1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
- D. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
 1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
 2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.
- E. Where dampproofing interior face of above-grade, exterior concrete and masonry walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft., or one trowel coat at not less than 4 gal./100 sq. ft..
- B. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft.

3.5 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071113

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. Bentonite Waterproofing Membrane
 - 2. Molded sheet drainage panels
 - 3. Protection Board
 - 4. Waterstop
- B. Key Abbreviations include the following:
 - 1. BWPM Bentonite Waterproofing Membrane
 - 2. DRP Drainage Panel
 - 3. WTRS Waterstop

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site prior to commencement of field installation to establish procedures to maintain working conditions and to coordinate this work with related and adjacent work. Verify that final waterproofing and waterstop details comply with waterproofing manufacturer's current installation requirements and recommendations. Pre-con meeting should include representatives for the owner, architect, weatherization consultant, inspection firm, general contractor and waterproofing contractor.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product with complete general and specific installation instructions, recommendations and limitations.
- B. Shop Drawings: Include installation details for waterproofing, penetrations and interface with other work.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates.
- B. Sample Warranty.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
- B. Source Limitations: Obtain waterproofing membrane with accessory products and prefabricated drainage materials from a single manufacturer to assure material compatibility.
- C. Independent Inspection: Owner will hire an independent inspection service to monitor waterproofing material installation compliance with the project contract documents and manufacturer's published literature and site-specific details. Inspections will include substrate examination, beginning of waterproofing installation, periodic inspections, and final inspection prior to backfill placement against the waterproofing.
- D. Mockups: Build mockups to verify selections made and to set quality standards for installation.
 - 1. Build mockup for each typical waterproofing installation, including accessories to demonstrate surface preparation, crack and joint treatments, corner treatments and protection.
 - a. Size: As indicated on Drawings.
 - 2. Do not incorporate mockups into Work.
 - 3. Protect all Architect accepted mockup as standard of quality for work of this section for duration of project.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery and Handling: Deliver materials in factory sealed and labeled packaging. Sequence deliveries to avoid delays, while minimizing on-site storage. Handle and store following manufacturer's instructions, recommendations and material safety data sheets. Protect from construction operation related damage, as well as damage from weather, excessive temperatures and prolonged sunlight. Remove damaged material from site and dispose of in accordance with applicable regulations.
- B. Storage: Do not double-stack pallets during shipping or storage. Protect waterproofing materials from moisture, excessive temperatures and sources of ignition. Provide cover, top and all sides for materials stored on-site, allowing for adequate ventilation.

1.8 FIELD CONDITIONS

- A. Substrate Conditions: Proceed with work only when substrate construction and preparation work is complete and in condition to receive waterproofing system. All plumbing, electrical, mechanical and structural items to be under or passing through the waterproofing shall be positively secured in their proper positions prior to waterproofing system installation. Substrate preparation shall be per waterproofing manufacturer's guidelines.
- B. Weather Conditions: Perform work only when existing and forecasted weather conditions are within the guidelines established by the manufacturer of the waterproofing materials. Do not apply waterproofing materials in areas of standing or active water; or over ice and snow.

Though exposure to precipitation and ground water seepage typically will not adversely affect waterproofing material, the General Contractor shall maintain site conditions to remove standing water from precipitation or ground water seepage in a timely manner.

1.9 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer and installer agrees to repair or replace bentonite waterproofing system that fails in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GEOTEXTILE / BENTONITE SHEETS (BWPM)

- A. Regular Geotextile/Bentonite Sheet: Minimum of 1.0 lb./sq. ft. of bentonite clay granules between two layers of polypropylene geotextile fabric, one woven and one nonwoven, needle punched and heat fused together.

1. Manufacturers: Subject to compliance with requirements, provide the following:
 - a. CETCO, a Minerals Technologies company; Voltex DS.
 - b. Approved equal.
2. Grab Tensile Strength: 95 lbf according to ASTM D 4632.
3. Puncture Resistance: 100 lbf according to ASTM D 4833.

2.2 MOLDED-SHEET DRAINAGE PANELS (DRP)

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 18 gpm per ft.

1. Products: Subject to compliance with requirements, provide the following:
 - a. CETCO, A Minerals Technologies company; Aquadrain 15x.
 - b. CETCO, a Minerals Technologies company; Aquadrain 100BD (Collector for Drainmat).

2.3 ACCESSORIES

- A. General: Manufacturer's standard accessories recommended for intended use and compatible with bentonite waterproofing.

- B. Waterstop (WTRS)
 - 1. Bentonite Rope:
 - a. CETCO, A Minerals Technologies company; Waterstop RX-101 (3" min. cover) with WB-Adhesive.
 - b. CETCO, A Minerals Technologies company; Waterstop RX-102 (2" min. cover) with WB-Adhesive.
- C. Bentonite Mastic:
 - 1. CETCO, A Minerals Technologies company; Volclay Bentoseal.
- D. Modular Link-Seal; Available from Link-Seal.
- E. Transition Membrane:
 - 1. CETCO, A minerals Technologies company; Envirosheet.
- F. Termination Bar: Minimum 1-inch wide aluminum or stainless-steel bar with pre-punched holes at 12-inches on center for fastening.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Prepare substrates, voids, cracks and cavities; and install waterproofing and accessories according to manufacturer's written instructions.
- B. Prevent Bentonite Waterproofing Membrane from hydrating before being covered with backfill. When threat of rain is imminent, or backfill is not immediate, membrane should be covered and protected.
- C. Install protection course before backfilling or placing overburden.

3.2 WATERSTOP INSTALLATION

- A. Install in all concrete construction joints (cold joints), below-grade and above-grade, according to manufacturer's written instructions.

3.3 GEOTEXTILE/BENTONITE SHEET INSTALLATION

- A. Install a continuous layer of waterproofing sheets directly against surface to be waterproofed. Lap ends and edges a minimum of 4 inches on horizontal and vertical substrates unless otherwise indicated. Stagger end joints between sheets a minimum of 24 inches. Fasten seams by stapling to adjacent sheet or nailing to substrate.

3.4 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.5 SCHEDULE – WATERPROOFING

- A. Provide waterproofing and drainage panels/protection board at:
 - 1. Exterior face of all below-grade foundation walls and footings where opposite side of foundation wall faces building interior, plenum, or occupied space.
 - 2. Elevator pit walls and related footings.
 - 3. All other locations as shown on the drawings.

END OF SECTION 071700

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 clear penetrating water-repellent/anti-graffiti coatings for the following:
 - 1. Exposed exterior, above-grade concrete surfaces consisting of the dumpster enclosure and site retaining walls. Do not apply to horizontal walking surfaces.
- B. Key Abbreviations include the following:
 - 1. WRP Water Repellent
- C. Related Requirements:
 - 1. Section 033000 "Cast-In-Place Concrete" for surfaces requiring water repellents.
 - 2. Section 079200 "Joint Sealants" for joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's printed statement of VOC content.
 - 2. Include manufacturer's standard colors.
 - 3. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.

1.4 INFORMATIONAL SUBMITALS

- A. Manufacturer Certificates: Signed by manufacturers certifying that water repellents comply with requirements.
- B. Qualification Data: For Applicator.
- C. Field quality-control reports.
- D. Sample Warranty: For special warranty.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who employs only persons trained and approved by water repellent manufacturer for application of manufacturer's products.
- B. Test Application: Apply a finish sample on wall surfaces, or mock-up where required for each type of water repellent and substrate required. Duplicate finish of approved sample.

1. Locate test application as directed by Architect.
2. Size: 25 sq. ft.
3. Final approval by Architect of water-repellent application will be from test applications.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:
1. Ambient temperature is less than 40 deg F.
 2. Concrete surfaces and mortar have cured for less than 28 days.
 3. Rain or temperatures below 40 deg F are predicted within 24 hours.
 4. Application is earlier than 24 hours after surfaces have been wet.
 5. Substrate is frozen or surface temperature is less than 40 deg F.
 6. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency specified warranty period.
1. Warranty Period: Five (5) years from date of Substantial Completion of the Project for graffiti protection. No exclusions accepted for wind driven rain.

PART 2 - PRODUCTS

2.1 PENETRATING ANTI-GRAFFITANT (WRP)

- A. Two coat system: Proprietary blend, clear penetrating water repellent and anti-graffitiant, suitable for use on concrete surfaces. Water repellent and anti-graffitiant shall be formulated from a clear silicone rubber-based formula.
- B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.
- C. Manufacturer: Provide products by the following:
1. Professional Products of Kansas, Inc.
 - a. First Coat: PWS-15 Super Strength.
 - b. Second Coat: PWS-8 Extra Strength.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
 - 1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
 - 2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
 - 3. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture and pH content, according to repellent manufacturer's written instructions, to ensure surface is sufficiently dry.
- B. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
- C. Protect adjoining work from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.

3.3 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
- B. Anti-Graffiti Coating for Exterior: Apply two coats of product on surfaces indicated for treatment using low pressure spray equipment. Apply per manufacturers recommendations. Apply in amounts as recommended by manufacturer. Comply with manufacturer's written instructions.
 - 1. Apply to all exterior exposed concrete and architectural precast concrete surfaces including retaining walls and exterior of dumpster enclosure. Do not apply to horizontal traffic surfaces.

3.4 FIELD QUALITY CONTROL

- A. Testing of Water-Repellent Material: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when water repellent is being applied:

1. Owner will engage the services of a qualified testing agency to sample water-repellent material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency will perform tests for compliance of water-repellent material with product requirements.
 3. Owner may direct Contractor to stop applying water repellents if test results show material being used does not comply with product requirements. Contractor shall remove non-complying material from Project site, pay for testing, and correct deficiency of surfaces treated with rejected materials, as approved by Architect.
- B. Coverage Test: In the presence of Architect, hose down a dry, repellent-treated surface to verify complete and uniform product application. A change in surface color will indicate incomplete application.
1. Notify Architect seven days in advance of the dates and times when surfaces will be tested.
 2. Reapply water repellent until coverage test indicates complete coverage.
- 3.5 CLEANING
- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Architect.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

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. Extruded polystyrene foam-plastic board.
2. Foamed-in-Place Insulation (Closed Cell Spray Foam)
3. Glass-fiber Blanket.
4. Mineral Wool Board.
5. Mineral Wool Blanket.
6. Vapor Retarder

- B. Key Abbreviations include the following:

- | | | |
|----|------|---------------------------------|
| 1. | ABF | Air Barrier Foam |
| 2. | BATI | Batt Insulation |
| 3. | FIPI | Foamed-in-Place Insulation |
| 4. | MWBI | Mineral-Wool Board Insulation |
| 5. | MWI | Mineral-Wool Blanket Insulation |
| 6. | RWI | Rigid Wall Insulation |
| 7. | VR | Vapor Retarder |

- C. Refer to Exterior Envelope Building Insulation Schedule on Sheet A3.40.

- D. Related Requirements:

1. Section 072500 "Weather Barriers" for Spray Polyurethane Foam.
2. Section 075419 "Single-Ply Membrane Roofing" for insulation specified as part of roofing construction.
3. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site prior to commencement of field installation to establish procedures to maintain working conditions and to coordinate this work with related and adjacent work. Verify that work of this section complies with manufacturer's current installation requirements and recommendations. Pre-con meeting should include representatives for the owner, architect, weatherization consultant, inspection firm, general contractor and insulation subcontractor.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Mockup: Mineral-Wool Board Insulation and Rigid Wall Insulation to set quality standards for installation.
 - 1. Build mockup for typical exterior insulation installation including accessories to demonstrate surface preparation, installation and conformance with specifications and manufacturer's written requirements.
 - 2. Do not incorporate mockups into Work.
 - 3. Protect all Architect accepted mockup as standard of quality for work of this section for duration of project.
- B. Closed Cell Spray Foam must be applied by a certified installer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

- A. Rigid Wall Insulation (RWI): Extruded Polystyrene Board, Type IV, ASTM C 578, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.

2.2 MINERAL-WOOL BOARD INSULATION

- A. Mineral-Wool Board, Type III, Unfaced (MWBI): ASTM C 612, Type III; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. Nominal density of 4.4 lb./cu. ft.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Roxul Inc.; CavityRock DD
 - b. Thermafiber, Inc.; an Owens Corning company; RainBarrier 45.
 2. Insulation Thickness: 2-inches.
 3. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 40 percent.

2.3 GLASS-FIBER BLANKET INSULATION

- A. Glass-Fiber Blanket, Unfaced (BATI): ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.
 - d. Owens Corning.
 2. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 50 percent.

2.4 MINERAL-WOOL BLANKET INSULATION

- A. Un-faced, Mineral-Wool Blanket Insulation (MWI): ASTM C 665, Type I (blankets without membrane facing); consisting of fibers with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively, per ASTM E 84, passing ASTM E 136 for combustion characteristics.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Roxul Inc.; Comfort Batt
- b. Thermafiber, Inc.; an Owens Corning company; SAFB (Sound Attenuation Fire Blankets).

2. Recycled Content: Postconsumer recycled content not less than 50 percent.

2.5 CLOSED CELL SPRAY POLYURETHANE FOAM

- A. Foamed-in-Place Insulation (FIPI): Closed-cell Spray Polyurethane Foam, ASTM C1029, Type II,
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Gaco Western; GacoOnePass F1850R (polyurethane foam insulation)
 - b. Accella Polyurethane Systems; Bayseal CC X (polyurethane foam insulation)
- B. Air Barrier Foam (ABF):
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hilti; CF 812 (Window & Door low pressure filler foam)

2.6 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders (VR): ASTM D 4397, 6-mil thick sheet, with maximum permeance rating of 0.1 perm.
- B. Vapor retarder Tape: Pressure sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.
- C. Adhesives for Vapor Retarders: Products recommended by vapor retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrate indicated.

2.7 ACCESSORIES

- A. Mechanical Fasteners for Mineral-Wool Board: Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
 - 1. Impaling Pins: Mechanically attached with aluminum impaling pin system. Screw attach perforated base back plate (wet set in WRB sealant) and spot back-flash over each fastener (screw).

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. 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.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches beyond exterior walls.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb./cu. ft.
 - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions. Fill all headers and trapped jamb studs at all exterior wall openings. Spray insulation to envelop entire area to be insulated and fill voids. Additional locations are shown on the drawings.

3.5 INSTALLATION OF VAPOR RETARDER

- A. Set vapor retarder to warm side of construction.
- B. Extend vapor retarder to extremities of areas to protect from vapor transmission. Secure vapor retarder in place with adhesive. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose fiber insulation.
- C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 - 1. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor retarder tape according to vapor retarder manufacturer's written instructions. Seal butt joints with vapor retarder tape. Locate all joints over framing members or other solid substrates.
- D. Seal joints and penetrations caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor retarder tape to create an airtight/vaportight seal between penetrating objects and vapor retarder.
- E. Repair tears or punctures in vapor retarder immediately before concealment by other work. Cover with vapor retarder tape or another layer of vapor retarder.

3.6 INSTALLATION OF MINERAL-WOOL BOARD INSULATION

- A. Install insulation in accordance with manufacturer's written recommendations.
- B. Install insulation to maintain continuity of thermal protection to building elements and spaces.
- C. Friction fit insulation in place as follows:
 - 1. For semi-rigid insulation batts or boards, score or cut insulation down its centerline to 50% maximum of its depth to enable fitting insulation in correct position.
 - 2. Fold edges of insulation board back to enable friction fitting in correct position. Position edges of partially folded board into space between thermal spacers and flatten partially folded board against substrate.
 - 3. Ensure insulation is tightly fitted with sides of insulation slightly compressed at each insulation spacer allowing no linear gaps between spacers.
- D. Fit insulation closely around objects in or passing through insulation.

3.7 PROTECTION

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

END OF SECTION 072100

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. Fully adhered water-resistive vapor permeable air barrier membrane system.
- B. Key Abbreviations include the following:
 - 1. WRBS Weather Resistant Barrier System

1.3 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site prior to commencement of field installation to establish procedures to maintain working conditions and to coordinate this work with related and adjacent work. Verify that work of this section complies with manufacturer's current installation requirements and recommendations. Pre-con meeting should include representatives for the owner, architect, weatherization consultant, inspection firm, general contractor and weather barrier subcontractor.
 - 1. Review air barrier requirements and installation, special details, air leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 PERFORMANCE REQUIREMENTS

- A. Comply with the specified performance requirements and characteristics as herein specified.
- B. Performance description:

1. The building envelope shall be constructed with a continuous, air and water-resistive barrier to control air leakage, avoid condensation in the interior wall assembly and prevent water intrusion.
2. Joints, penetrations and paths of water and air infiltration shall be made watertight and airtight.
3. System shall be capable of withstanding positive and negative combined wind, stack and HVAC pressures on the envelope without damage or displacement.
4. System shall be installed in an airtight and flexible manner, allowing for the relative movement of systems due to thermal and moisture variations.

1.6 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's current product data sheets, details and installation instructions for each type of product, including accessories.

1.7 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.
- B. Sample Warranty complying with the requirements of this Section.

1.8 QUALITY ASSURANCE

- A. Single Source: Self-adhered water-resistive vapor permeable air barrier membrane components and accessories must be obtained as a single-source membrane system to ensure total system compatibility and integrity.
- B. Manufacturer's Qualifications: Manufacturer of specified products listed in this Section to have experiences in-house technical and field observation personnel qualified to provide expert technical support.
- C. Fire Performance Characteristics: Provide water-resistive barrier meeting the following fire-test characteristics.
 1. Surface-Burning Characteristics: ASTM E84
 2. Flame Spread Index: 5 or less.
 3. Smoke Developed Index: 15 or less.
- D. Mockup: Weather Barrier Assembly to set quality standards for installation.
 1. Build mockup for typical weather barrier assembly including accessories to demonstrate surface preparation, installation and conformance with specifications and manufacturer's current written requirements.
 2. Do not incorporate mockups into Work.
 3. Protect all Architect accepted mockup as standard of quality for work of this section for duration of project.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
- B. Store rolls on end in original packaging. Protect rolls from direct sunlight and inclement weather until ready to use.

1.10 COORDINATION

- A. Ensure continuity of the fully self-adhered water-resistive vapor permeable air barrier system throughout the scope of this Section.
 - 1. Air barrier vapor permeable membrane to include self-adhered air barrier, transition membranes and sealants at penetrations.
 - 2. Drainage plane to include drainage cavity, water resistive barrier and flashings to the exterior.

1.11 WARRANTY

- A. Provide manufacturer's standard material warranty in which manufacturer agrees to provide replacement material for the fully self-adhered water-resistive vapor permeable air barrier sheets installed in accordance with manufacturer's instructions that fail due to material defects within 20 years of the date of purchase.

PART 2 - PRODUCTS

2.1 WEATHER-RESISTIVE BARRIER SYSTEM (WRBS)

- A. Primary Building Wrap: Primary fully self-adhered air barrier sheet membrane shall be WrapShield SA® Self-Adhered Water-Resistive Vapor Permeable Air Barrier Sheet by VaproShield, a zero VOC fully self-adhered vapor permeable air barrier sheet membrane consisting of multiple layers of spun-bonded polypropylene tested in accordance with ICC-ES AC 38 criteria to meet IBC and IRC requirements for weather resistive barriers
 - 1. Basis of Design Product: Subject to compliance with requirements, provide VaproShield; WrapShield-SA. Reveal Shield SA at open join locations.
 - 2. Color: Orange with allowable UV exposure for 180 days, prior to coverage.
 - 3. Breaking strength and Elongation to ASTM D5034: 88 lbf, machine direction; 83 lbf, cross-machine direction.
 - 4. Water Vapor Permeance tested to ASTM E96 Method B: minimum of 50.45 perms.
 - 5. Water Vapor Permeance tested to ASTM E398: minimum of 52.57 perms.
 - 6. Air Leakage: ≤ 0.00002 cfm/ft² @ 1.57 psf when tested in accordance with ASTM E2178 and < 0.01 cfm/ft² @ 1.57 psf when tested in accordance with ASTM E2357 and. Meets Air Barrier Association of America (ABAA) requirements for "Adhesive Backed Commercial Building Wraps".
 - 7. Water Resistance tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage

8. Application Temperature: Ambient temperature must be above 20 °F.
 9. Surface Burning Characteristics tested to ASTM E84: Class A, Flame-spread index of less than 5, Smoke-developed index of less than 15
 10. Physical Dimensions: 0.022 inches thick and 59 inches wide and 7.58 oz/yd².
- B. Self-Adhesive Membrane: Roller applied. Use approved primer when adhering to concrete, exterior gypsum and wood. Prime substrates per manufacturer recommendation. Check compatibility between caulking and self-adhesive membrane types before installing.
1. S.A.M. 1
 - a. Grace Construction; Grace Ultra (butyl based backed by polyethylene).
 - b. Protecto Wrap Company; Jiffy Seal Butyl Ice & Water Guard HT.
 2. S.A.M. 2
 - a. VaproShield; 3" VaproTape (for use with Wrapshield).
 3. S.A.M HT – High Temperature
 - a. Grace Construction; Grace Ultra (butyl based backed by polyethylene)
 - 1) Not for use in conjunction with PVC materials.
 - b. Protecto Wrap Company; Jiffy Seal Butyl Ice & Water Guard HT.
- C. Building-Wrap Accessories: Pressure-sensitive plastic tape, two dimensional and three-dimensional preformed corners, preformed utility boots and a full range of manufacturer accessories recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.
1. Flashing Panels: Where manufacturer does not produce preformed utility penetration flashing panels, provide Quickflash Weatherproofing Products, Inc. to weatherproof all utility penetrations.
- D. Liquid Applied Flashing Membrane: Use VaproLiqui-Flash as a liquid flashing membrane on rough openings of exterior walls. Install per manufacturer's recommendation to prepared substrate.
1. Apply to clean surfaces free of contaminants. Chemical residues, surface coatings or films may adversely affect adhesion.
 2. Ensure positive drainage at all rough openings.
 3. Do not apply to surfaces with standing water.

2.2 MISCELLANEOUS MATERIALS

- A. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
- B. Screw Head Caps: VaproShield; VaproCaps (for use with Wrapshield air barrier design) installed per manufacturer recommendations.

- C. Spray Adhesive: Westech Aerosol Corporation; WT-MP13 Multi-Purpose Clear Spray Adhesive (for adhesion of WRB to steel and concrete).
- D. Closed Cell Spray Foam: Spray Polyurethane Insulation as specified in Section 072100 "Thermal Insulation".
- E. Quickflash Device: For electrical boxes and pipe penetrations. Available from Quickflash Weatherproofing Products Inc.
- F. Neoprene Pad: Texcel; TEX-NEO60 Duro Neoprene Sheet.
- G. Conduit: Delikon; Flexible Steel Reinforced PVC Coated Conduit YF-707.
- H. Nails and Staples: ASTM F 1667.
- I. WrapShield Factory Formed Corners: For use at soffits.

PART 3 - EXECUTION

3.1 GENERAL

- A. Verify that surfaces and conditions are ready to accept the work of this Section. Notify Architect in writing of any discrepancies. Commencement of work shall mean acceptance of the prepared substrates.
- B. All surfaces must be dry, sound, clean, free of oil, grease, dirt or other contaminants detrimental to the adhesion of the water resistive membrane and flashings. Fill voids and gaps greater than 7/8 inch in width to provide an even surface.
- C. Minimum application temperature of fully self-adhered membrane and flashings to be above 20 degrees F.
- D. Mechanical fasteners used to secure sheathing surfaces or penetrate sheathing surfaces shall be set flush with sheathing, fastened into solid backing and covered with the upper overlapping membrane. If exposed fasteners are present on the surface of the membrane, cover and seal with Vapro-LiquiFlash.
- E. If exposed fasteners are required, use VaproCaps to insure water/airtight seal.

3.2 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.

2. Apply barrier to cover vertical flashing with a minimum 3-inch overlap unless otherwise indicated.
3. Stagger all end lap seams.

C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings.
3. Roll installed membrane with roller to ensure positive contact and adhesion with substrate immediately.

D. Building Transition Conditions:

1. Tie-in to structural beams, columns, floor slabs and intermediate floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials with self-adhering air barrier transition and flashing membrane.
2. Align and position fully self-adhered air barrier transition and flashing membrane, remove protective film and press firmly into place. Provide minimum 3-inch lap on substrates.
3. Ensure minimum 6-inch overlap at side and end laps of membrane and 12-inch at inside and outside corners, if joints occur at corner locations.
4. Roll membrane and lap seams with roller to ensure positive contact and adhesion, immediately.

E. Air Barrier Penetrations:

1. Mechanical pipe, electrical conduit and/or duct work must be secured solid into position prior to installation of fully self-adhered vapor permeable air barrier membrane.
2. Electrical services penetrating the wall assembly and fully self-adhered vapor permeable air barrier membrane must be placed in appropriate conduit and secured solid into position.
3. All penetrations through the air barrier that lead into vented space need to be sealed with spray foam.

3.3 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.4 FIELD QUALITY CONTROL

- A. Make notification when sections of work are complete to allow review prior to covering fully self-adhered water-resistive vapor permeable air barrier system.

- B. Owner to engage independent consultant to observe substrate and membrane installation prior to placement of cladding system(s) and provide written documentation of observations.

3.5 PROTECTION

- A. Protect wall areas covered with self-adhered water-resistive vapor permeable air barrier from damage due to construction activities, high wind conditions, and extended exposure to inclement weather.
- B. Review condition of fully self-adhered water-resistive vapor permeable air barrier prior to installation of cladding. Repair, or remove and replace damaged sections with new membrane.

END OF SECTION 072500

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. Work described in this section includes complete system of concealed-fastener lap seam metal panel system, perimeter and penetration flashing and closures, including sub-framing system.

- B. Section Includes:

1. Sub-framing thermal spacers creating a continuous exterior-insulated rainscreen assembly.
2. Concealed-fastener, lap-seam metal wall panels.
3. Metal soffit panels
4. Miscellaneous metal sub-framing.

- C. Key Abbreviations include the following:

1. HCH Hat-Channel
2. MSP- (#) Metal Soffit Panel
3. MWP- (#) Metal Wall Panel (MWP-#)
4. MWPT Metal Wall Panel Trim
5. NPC Neoprene Closure
6. PMIS Perforated Metal Insect Screen
7. STS Sub-framing Thermal Spacer
8. ZCH Z-Shaped Furring Channel

- D. Related Sections:

1. Section 072500 "Weather Barriers".
2. Section 072100 "Thermal Insulation".
3. Section 076200 "Sheet Metal Flashing and Trim".
4. Section 079200 "Joint Sealants".

E. PREINSTALLATION MEETINGS

1. Preinstallation Conference: Conduct conference at Project site prior to commencement of field installation to establish procedures to maintain working conditions and to coordinate this work with related and adjacent work. Verify that work of this section complies with manufacturer's current installation requirements and recommendations.
 - a. Meet with Owner, Architect, weatherization consultant, inspection firm, metal panel installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels.

- b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- c. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
- d. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
- e. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
- f. Review temporary protection requirements for metal panel assembly during and after installation.
- g. Review of procedures for repair of metal panels damaged after installation.
- h. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

- 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.

- 1. Include Samples of trim and accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

B. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
 - 1. Installer's responsibilities include fabricating and installing metal wall panel assemblies and providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of data for metal wall panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.
- C. Mockup: Metal Wall Panel Assembly to set quality standards for installation.
 - 1. Build mockup for typical metal wall panel assembly including accessories to demonstrate surface preparation, installation and conformance with specifications and manufacturer's current written requirements.
 - 2. Do not incorporate mockups into Work.
 - 3. Protect all Architect accepted mockup as standard of quality for work of this section for duration of project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Five (5) years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 CONCEALED-FASTENER, INTERLOCKING LAPPED SEAM METAL WALL PANELS

- A. General: Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners allowing thermal movement. Include accessories required for weathertight installation.
- B. Concealed-fastener, lap seam, vertical application, exterior metal wall panel (MWP-1)
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide AEP Span; A Division of ASC Profiles, LLC; Flex Series or a comparable product by one of the following:
 - a. Approved equal.
 - 2. Panels:
 - a. Material: Steel conforming to ASTM A792. Yield strength 50,000 psi; with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50.
 - b. Profile:
 - 1) MWP-1 type A: 2" rib with 2" reveal, 1.2FX10-12 (1 ¼" rib height).
 - 2) MWP-1 type B: 4" rib with 2" reveal, 1.2FX40-12 (1 ¼" rib height).
 - 3) MWP-1 type C: 10" rib with 2" reveal, 1.2FX20-12 (1 ¼" rib height).
 - c. Exterior Panel Finish: Provide primer and finish coat on exposed faces; provide primer on concealed faces of panels.
 - 1) DuraTech® 5000: Polyvinylidene Fluoride, full 70 percent Kynar 500/Hylar 5000, consisting of a baked-on 0.15-0.20 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 8 to 15 when tested in accordance with ASTM D523 at 60 degrees.
 - 2) Color: Slate Grey.
 - d. Fastening: Direct, concealed fasten.
 - e. Panel Coverage: 12-inches.
 - f. Panel Height: 1.25-inches.
 - g. Panel Gauge: 22 gauge.
- C. Concealed-fastener, lap-seam, horizontal application, exterior metal wall panel (MWP-2).
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide AEP Span; A Division of ASC Profiles, LLC; Flex Series or a comparable product by one of the following:
 - a. Approved equal.
 - 2. Panels:
 - a. Material: Steel conforming to ASTM A792. Yield strength 50,000 psi; with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50.
 - b. Profile:

- 1) MWP-2: 10" rib with 2" reveal, 1.2FX20-12 (1 ¼" rib height).
- c. Exterior Panel Finish: Provide primer and finish coat on exposed faces; provide primer on concealed faces of panels.
 - 1) DuraTech® 5000: Polyvinylidene Fluoride, full 70 percent Kynar 500/Hylar 5000, consisting of a baked-on 0.15-0.20 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 8 to 15 when tested in accordance with ASTM D523 at 60 degrees.
 - 2) Color: Cool Metallic Copper
- d. Fastening: Direct, concealed fasten.
- e. Panel Coverage: 12-inches.
- f. Panel Height: 1.25-inches.
- g. Panel Gauge: 22 gauge.

2.3 METAL SOFFIT PANELS

- A. General: Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners allowing thermal movement. Include accessories required for weathertight installation.
- B. Concealed-fastener, lap seam, soffit application, exterior metal soffit panel (MSP-1)
 1. Basis-of-Design Product: Subject to compliance with requirements, provide AEP Span; A Division of ASC Profiles, LLC; Flex Series or a comparable product by one of the following:
 - a. Fabral
 - b. Metal Sales Manufacturing Corporation
 - c. Taylor Metal Products
 - d. The Bryer Company
 2. Panels:
 - a. Material: Steel conforming to ASTM A792. Yield strength 50,000 psi; with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50.
 - b. Profile:
 - 1) MWP-1 type A: 2" rib with 2" reveal, 1.2FX10-12 (1 ¼" rib height).
 - 2) MWP-1 type B: 4" rib with 2" reveal, 1.2FX40-12 (1 ¼" rib height).
 - 3) MWP-1 type C: 10" rib with 2" reveal, 1.2FX20-12 (1 ¼" rib height).
 - c. Exterior Panel Finish: Provide primer and finish coat on exposed faces; provide primer on concealed faces of panels.
 - 1) DuraTech® 5000: Polyvinylidene Fluoride, full 70 percent Kynar 500/Hylar 5000, consisting of a baked-on 0.15-0.20 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 8 to 15 when tested in accordance with ASTM D523 at 60 degrees.

2) Color: Slate Grey.

- d. Fastening: Direct, concealed fasten.
- e. Panel Coverage: 12-inches.
- f. Panel Height: 1.25-inches.
- g. Panel Gauge: 22 gauge.

C. Exterior linear metal ceiling system (MSP-2)

1. Basis-of-Design Product: Subject to compliance with requirements, provide Multi-Box Continuous linear metal panel ceiling system manufactured by Hunter Douglas Ceilings & Walls exclusively from CertainTeed, Inc. or a comparable product by one of the following:
 - a. Approved Equal.
2. Linear metal panel ceiling system for exterior installations.
3. Panel Profile Type: An array selected from the Box Series profiles, utilizing Universal Carrier. Formed linear aluminum panels with square edges, thickness per manufacturer recommendation.
 - a. Pattern: As shown on Drawings.
 - b. Perforations: Non-perforated.
 - c. Closure: Flat recessed closure, 5/8" wide roll-formed aluminum hat-shaped closure panel to snap-fit between ceiling panels.
 - 1) Finish: Black
 - d. Carrier: Universal hat-shaped, 0.038" roll-formed aluminum section with hook-shaped tabs spaced to receive ceiling panels at 2" on-center and 27/32" apart. Support holes spaced 4" on-center.
 - 1) Finish: Factory-applied black enamel.
 - e. Panel End Caps: Formed, stamped, or milled end caps with matching finish.
4. Panel Finish: Powder Coat in custom color as selected by Architect.

2.4 SUB-FRAMING THERMAL SPACER (STS)

- A. Basis-of Design Product: Subject to compliance with requirements, provide:
 1. Advanced Architectural Products: SMART ci GreenGirt Composite Framing Support System.
- B. Sub-framing Thermal Spacer: Polyester and vinyl ester bio resin matrix with recycled materials, fire retardant additives and integral continuous metal inserts the length of the profile.
 1. Thermal Spacer Depth: 2" unless otherwise noted.

- C. Spacer Fasteners: Manufacturer's standard corrosion resistant fasteners for concealed fastening of thermal spacer. Fasteners shall be self-drilling type complying with requirements of AISI S200 and of sufficient length to penetrate steel studs plus 4 screw threads.
 - 1. For thermal spacers installed at minimum 24-inches on center, provide #10 screws with minimum 0.333" head diameter.
 - 2. Space screws at maximum 16-inches on center.
 - 3. Pre-drill concrete or concrete masonry unit substrate to ½ inch deeper than anticipated embedment depth of fastener into substrate
 - a. Use drill diameter approximately 1/16 inches less than screw diameter in accordance with fastener manufacturer's written recommendations.
- D. Sub-framing: Ensure thermal spacer type is selected to accommodate orientation of vertical and horizontal sub-framing.

2.5 MISCELLANEOUS METAL FRAMING

- A. Miscellaneous Metal Sub-framing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G60 coating designation or coating with equivalent corrosion resistance. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Hat-Shaped, Rigid Furring Channels (HCH): Cold rolled hat channels, 0.040-inch nominal thickness (18 ga.), ASTM C 645 with G40 hot dipped galvanized 7/8" depth channels. Provide slotted channels at horizontal members.
- C. Z-Shaped Furring Channels (ZCH): Cold rolled Z-channels, 0.040-inch nominal thickness (18 ga.), with slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, and depth required to fit insulation thickness indicated.
- D. Cold-Formed Flat Strap: Steel sheet for blocking in length, width and thickness required to secure specified metal wall panels.

2.6 MISCELLANEOUS MATERIALS

- A. Wall Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closures: Provide closures fabricated of same metal as metal panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips (NPC): Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 - 4. Flashing Clips:

- a. 300 series stainless steel.
 - b. Pre-punched for attachment into substrate.
 - c. Thickness: 0.020"
 - d. Designed to withstand negative load requirements.
- 5. Fasteners for clip attachments to steel substrate:
 - a. #12, 300 series stainless steel, thread design and length appropriate for substrate.
- 6. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2-inch-wide and 1/8 inch thick.
 - b. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - c. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311
- B. Flashing and Trim (MWPT): 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.
- C. Perforated Metal Insect Screen (PMIS): Perforated 22-gauge galvanized steel break metal insect screen with 1/16" diameter round holes at 3/32" centers, staggered, with 41% open area. Fasten to sub-framing and size to tightly abut horizontal leg to weather barrier assembly system.
 - 1. Product: McNichols #1411332241, or approved equal.

2.7 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements within panel assembly.

- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.8 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking, and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install spacers, subgirts, base angles, sills, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 RAINSCREEN INSTALLATION

- A. Mount fiberglass support spacers as engineered for support of the metal wall panels, using self-tapping screw for each attachment hole provided in spacer.
- B. Provide continuous bed of sealant along top edge of horizontal Sub-framing Thermal Spacers.
- C. Check plumb of girts both parallel and perpendicular to the structure.
- D. Where obstructions are present and unavoidable (i.e. window openings), restart girt in exact alignment on other side of obstruction.
- E. Rainscreen cavities shall have approved closure accessories (i.e. insect screen) to prevent the introduction of insects and/or debris.
- F. Furring/strapping of all material types to maintain 1/2" gap at butt joints and floor plate level.

3.4 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Install metal wall panels perpendicular to girts and subgirts, unless otherwise indicated.
 - 2. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 3. Do not field-cut metal wall panels by torch.
 - 4. Fasten metal wall panels in accordance with manufacturer's instructions.
 - 5. Flash and seal metal wall panels with weather closure edges and at perimeter of openings.
 - 6. Install flashing and trim as metal wall panel work proceeds.
 - 7. Fasten flashings and trim around openings and similar elements.
 - 8. Do not allow construction debris to contaminate metal wall panels.
 - 9. Metal wall panels to be continuous. No lapping.
- B. Fasteners: Use fasteners of type and size that will secure wall components in compliance with design load requirements.
- C. Conceal fasteners and expansion provisions, where possible, in exposed work and locate to minimize possibility of leakage.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- E. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Flash and seal panels with weather closures at perimeter of all openings.

2. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
3. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
4. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

3.5 METAL SOFFIT PANEL INSTALLATION

- A. Metal Soffit Panels, MSP-1: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing
 1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.
 2. Metal Soffit Panels, MSP-2: Install exterior linear metal ceiling system per manufacturers shop drawings and per manufacturers written instructions.

3.6 ACCESSORY INSTALLATION

- A. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch-deep, filled with mastic sealant (concealed within joints).

3.7 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213

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 metal composite material wall panels.
- B. Key Abbreviations include the following:
 - 1. ACM Aluminum Composite Material

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal composite material panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Composite Material Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal composite material panel accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.

- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal composite material panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal composite material panels, and other manufactured items so as not to be damaged or deformed. Package metal composite material panels for protection during transportation and handling.
- B. Unload, store, and erect metal composite material panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal composite material panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal composite material panels to ensure dryness, with positive slope for drainage of water. Do not store metal composite material panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal composite material panels during installation.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal composite material panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate metal composite material panel installation with flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- D. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing.

2.2 METAL COMPOSITE MATERIAL WALL PANELS (ACM)

- A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide ALUCOBOND; 3A Composites USA, Inc ; ALUCOBOND Plus. or a comparable product by one of the following:
 - a. Approved Equal.

- B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch-thick, coil-coated aluminum sheet facings.
 - 1. Panel Thickness: 0.157 inch.
 - 2. Core: Fire retardant.
 - 3. Exterior Finish: Two-coat fluoropolymer.
 - a. Color: As selected by Architect from manufacturer's full range.
- C. Attachment Assembly Components: Formed from extruded aluminum.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material 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 composite material panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.

2.4 FABRICATION

- A. General: Fabricate and finish metal composite material panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:
 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.
 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.

- B. Examine roughing-in for components and assemblies penetrating metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal composite material panel manufacturer's written recommendations.

3.3 METAL COMPOSITE MATERIAL PANEL INSTALLATION

- A. General: Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal composite material panels.
 - 2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal composite material panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.
- D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
 - 1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

- E. Installation: Attach metal composite material wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.
 - 1. Dry Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gasket system.
- F. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-turned flanges of wall panels to panel clips with manufacturer's standard fasteners.
 - 1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 079200 "Joint Sealants."
 - 2. Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gaskets.
- G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.
- H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 - 1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation

instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.

- B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074214

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. Exterior solid phenolic wall cladding factory fabricated panel system and accessories as required for a complete drained rainscreen system.
 - 2. Interior solid phenolic wall cladding factory fabricated panel system and accessories.
- B. Key Abbreviations include the following:
 - 1. CRP Composite Resin Panel
 - 2. CRPT Composite Resin Panel Trim
 - 3. HCH Hat-Shaped Furring Channel
 - 4. PMIS Perforated Metal Insect Screen
 - 5. STS Sub-framing Thermal Spacer
 - 6. ZCH Z-Shaped Furring Channel
- C. Related Requirements:
 - 1. Section 072500 "Weather Barriers".
 - 2. Section 072100 "Thermal Insulation".
 - 3. Section 076200 "Flashing & Sheet Metal".
 - 4. Section 079200 "Joint Sealants".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Storage and handling requirements and recommendations.
 - 3. Material property datasheet.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work, specific to this project, as necessary to describe and convey the layout, profiles and product components, including edge conditions, panel joints, fixture locations, and finish color.
 - 2. Include details of the flashing, trim, sub-framing, and anchorage systems.

- C. Samples for Verification: For each type of cladding indicated with factory-applied finish.

- 1. Include samples of trim, exposed fastener, and accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Sample Warranty: For manufacturer's warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For phenolic wall siding maintenance and cleaning information to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Single Source Responsibility: Materials from a single manufacturer for each component and warranty.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in an enclosed area protected from direct sunlight, moisture and heat. Maintain a consistent temperature and humidity.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Stack panels using protective dividers to avoid damage to decorative surface.
- D. Do not store fabricated panels vertically.
- E. Remove protective film within 24 hours of the panels being removed from the pallet.
- F. When moving panels, lift evenly to avoid dragging panels across each other and scratching the decorative surface.
- G. Remove all labels and stickers immediately after installation.

1.8 FIELD CONDITIONS

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

- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly to be performed according to manufacturer's written instructions and warranty requirements.
- C. Field Measurements: Verify actual measurements by field measurements performed by the installer.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace phenolic wall siding that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Ten (10) years from date of Substantial Completion.
- B. Installer Warranty: Installer to warrant installation defects for a period of 4-years. Repair or replace materials during warranty period at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide Fiberresin Industries, Inc.; Stonewood Architectural Panels.

2.2 COMPOSITE RESIN PANEL SYSTEM (CRP)

- A. Phenolic Exterior Wall Cladding: Solid phenolic laminate panel with UV protective clear coat.
 - 1. Style: Exposed Fastener (EF) System
 - 2. Finish: Factory #60 matte.
 - 3. Colors:
 - a. CRP-1: Stonewood Standard Color; North Sea 2462-CB
 - b. CRP-2: Stonewood Standard Color; Fashion Gray 5619-CB
 - c. CRP-3: Stonewood Studio Collection: Signal Brown 8002-CB
 - 4. Thickness: 5/16" (8mm)
 - 5. Panel Size: Per drawings.
 - 6. Panel Core: Phenolic resin treated layer, black and natural brown kraft paper.
 - 7. Decorative Layer: Melamine resin, propriety layer combining pigment protection, ultraviolet light and weather resistant layer.
 - 8. ASTM E84 Flame and Smoke Development: Class A with Flame Spread Index (<25) and Smoke-Developed Index (<450) complying with IBC Section 1409 – High Pressure Decorative Exterior Grade Compact Laminates (HPL).
- B. Fabrication Tolerances: Manufacturer to provide shop fabrication and pre-finishing for a warranted finish.

1. Field fabrication shall be allowed where necessary but shall be kept to a minimum.
2. Appearance: Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.

C. Accessories:

1. Fasteners: Manufacturer approved austenitic stainless-steel fastener with bi-metal welded carbon steel point.
 - a. Sx3-D12 Fastener, painted to match Stonewood panels.
2. Attachment System: Manufacturer's sub-frame system to support panel cladding.
 - a. Stonewood EF Exposed Fastener Mounting System (CRPT) comprising of the following shapes:
 - 1) EFHB: where two panels adjoin
 - 2) EFZB: mid-panel support
 - 3) EFEB: at end panels
 - 4) EFB01: top flashing
 - 5) EFB02: bottom flashing
 - 6) EFB03: intermediate flashing

2.3 SUB-FRAMING THERMAL SPACER (STS)

A. Basis-of Design Product: Subject to compliance with requirements, provide:

1. Advanced Architectural Products: SMART ci GreenGirt Composite Framing Support System.

B. Sub-framing Thermal Spacer: Polyester and vinyl ester bio resin matrix with recycled materials, fire retardant additives and integral continuous metal inserts the length of the profile.

1. Thermal Spacer Depth: 2" unless otherwise noted.

C. Spacer Fasteners: Manufacturer's standard corrosion resistant fasteners for concealed fastening of thermal spacer. Fasteners shall be self-drilling type complying with requirements of AISI S200 and of sufficient length to penetrate steel studs plus 4 screw threads.

1. For thermal spacers installed at minimum 24-inches on center, provide #10 screws with minimum 0.333" head diameter.
2. Space screws at maximum 16-inches on center.
3. Pre-drill concrete or concrete masonry unit substrate to ½ inch deeper than anticipated embedment depth of fastener into substrate
 - a. Use drill diameter approximately 1/16 inches less than screw diameter in accordance with fastener manufacturer's written recommendations.

- 2.4 Sub-framing: Ensure thermal spacer type is selected to accommodate orientation of vertical and horizontal sub-framing

2.5 MISCELLANEOUS METAL FRAMING

- A. Hat-Shaped, Rigid Furring Channels (HCH): Cold rolled hat channels, 0.040-inch nominal thickness (18 ga.), ASTM C 645 with G40 hot dipped galvanized 7/8" depth channels. Provide slotted channels at horizontal members.
- B. Z-Shaped Furring Channels (ZCH): Cold rolled Z-channels, 0.040-inch nominal thickness (18 ga.), with slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, and depth as required.

2.6 MISCELLANEOUS MATERIALS

- A. Perforated Metal Insect Screen (PMIS): Perforated 22-gauge galvanized steel break metal insect screen with 1/16" diameter round holes at 3/32" centers, staggered, with 41% open area. Fasten to sub-framing and size to tightly abut horizontal leg to weather barrier assembly system.
 - 1. Product: McNichols #1411332241, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking, and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install spacers, subgirts, base angles, sills, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 RAINSCREEN INSTALLATION

- A. Mount fiberglass support spacers as engineered for support of the metal wall panels, using self-tapping screw for each attachment hole provided in spacer.
- B. Provide continuous bed of sealant along top edge of horizontal Sub-framing Thermal Spacers.
- C. Check plumb of girts both parallel and perpendicular to the structure.
- D. Where obstructions are present and unavoidable (i.e. window openings), restart girt in exact alignment on other side of obstruction.
- E. Rainscreen cavities shall have approved closure accessories (i.e. insect screen) to prevent the introduction of insects and/or debris.
- F. Furring/strapping of all material types to maintain 1/2" gaps at butt joints and floor plate level.

3.4 COMPOSITE RESIN PANEL INSTALLATION

- A. Install solid phenolic wall panels and sub-frame system in accordance with manufacturer's written instructions and Shop Drawings, maintaining required 1-inch ventilation spacing requirement.
- B. Install solid phenolic wall panels plumb and level and accurately spaced.
- C. Fasten solid phenolic wall panels with fasteners approved for use with supporting substrate.
- D. Do not install panels or component parts which are observed to be defective or damaged including but not limited to: warped, bowed, abraded, scratched, and broken members.
- E. Do not cut or trim component parts during installation in a manner that would damage the finish, decrease the strength, or result in a visual imperfection or a failure in performance.

3.5 ADJUSTING AND CLEANING

- A. Remove masking or panel protection as soon as possible after installation.
- B. Adjust final panel installation so that all joints are true and even throughout the installation. Panels out of plane shall be adjusted with the surrounding panels to minimize any imperfection.
- C. Remove and replace damaged panels.
- D. Clean finished surfaces as recommended by panel manufacturer.

3.6 PROTECTION

- A. Protect surface, corners and components from damage prior to Owner occupancy.

END OF SECTION 074633

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. Fiber-cement panels and trim.
- B. Key Abbreviations include the following:
 - 1. FCEP Fiber-Cement Exterior Panels
 - 2. FCET fiber Cement Exterior Trim

1.3 COORDINATION

- A. Coordinate siding installation with adjoining construction to ensure proper sequencing.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of fiber-cement siding.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
- C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with labels intact until time of use.
- B. Store materials on elevated platforms, under cover, and in a dry location.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide James Hardie Building Products, Inc.; Fiber-Cement Vertical Siding Panels, or a comparable product by one of the following:
 - a. CertainTeed Corporation.
 - b. MaxiTile, Inc.
 - c. Nichiha Fiber Cement.
 - d. Norandex Building Materials Distribution, Inc.
- B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- C. Fiber-Cement Vertical Siding Panel (FCEP): Hardie Panel HZ10.
 - 1. Panel: 48-inch wide sheets with smooth texture.
 - 2. Thickness: 5/16 inch.
 - 3. Lengths: As shown on drawings.
- D. Factory Priming: Manufacturer's standard acrylic primer.

2.2 FIBER-CEMENT EXTERIOR TRIM

- A. Fiber-Cement Exterior Trim (FCET): Primed cement in manufacturer's standard lengths complying with ANSI/AHA A135.6, with manufacturer's standard exterior primer.
 - 1. Thickness: 1" (nominal), 3/4" (net).
 - 2. Texture: Smooth
 - 3. Width: 6" nominal, unless otherwise indicated on plans.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding and soffit and related accessories.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Do not install damaged components.
- B. Fiber Cement Exterior Panels: Install panels complying with Manufacturer's written installation requirements.
 - 1. Blocking must be installed between studs where horizontal joints will fall.
 - 2. Fasteners shall be placed no closer than 3/8" from sheet edges and no closer than 2" from sheet corners.
 - 3. Provide field fastening of panels per manufacturers recommendations.
 - 4. Countersink exposed fasteners, fill smooth, and prepare for painting.
 - 5. Refer to Manufacturer's recommendations for type and size of fasteners required.
- C. Fiber Cement Exterior Siding: Install siding complying with AHA's "Recommended Basic Application Instructions for Hardboard Siding."
 - 1. Caulk at butt joints for a smooth uniform surface.
 - 2. Fasteners shall be placed no closer than 3/8" and no further than 1/2" from the plank edge and no closer than 3/4" and no further than 1" from the plank bottom edge.
- D. Fasten all panels and related components into solid blocking.
- E. Carefully measure and position the trim as detailed on the drawings.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074646

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. Scope: To install a complete mechanically attached engineered system including membrane, flashings and other components.

- B. Section Includes:

1. Mechanically attached single-ply membrane roofing system.
2. Coverboard.
3. Roof Insulation.
4. Modified Bituminous Vapor Retarder.
5. Substrate Board.
6. Clad Metal Flashing
7. Walkway Pads

- C. Key Abbreviations include the following:

- | | | |
|----|------|------------------------------------|
| 1. | CBD | Coverboard |
| 2. | MBVR | Modified Bituminous Vapor Retarder |
| 3. | RRI | Rigid Roof Insulation |
| 4. | SPLF | Single-ply Liquid Flashing |
| 5. | SPMF | Single-ply Membrane Flashing |
| 6. | SPMR | Single-ply Membrane Roofing |
| 7. | SSBD | Substrate Board |
| 8. | TI | Tapered Insulation |

- D. Related Requirements:

1. Section 053100 "Steel Decking" for steel roof deck panels.
2. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
3. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings not integrally connected to membrane roofing systems.
4. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
5. Section 221300 "Soil, Waste, Vent and Storm Drain Piping Systems" for roof drains.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
 - 7. Review governing regulations and requirements.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Roof plan showing orientation of steel roof deck and orientation of roofing, fastening spacings, and patterns for mechanically fastened roofing.
 - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Fastener Requirements: Provide roofing manufacturer's layout, spacing and installation requirements, for mechanical fasteners with enhancements at perimeter and corner conditions, including substrate board, coverboard, and single ply membrane. Also provide single ply manufacturer required spacing and mechanical fastener types for mechanical securement at vertical transitions, perimeter transitions, and penetrations.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of compliance with performance requirements.

- 2. Submit certification letter stating that the insulation is approved by the roofing membrane manufacturer and is fully warranted as part of the installed roofing system.
- C. Product Test Reports: For components of roofing system, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- E. Field quality-control reports.
- F. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Documented final acceptance of installation from the Manufacturer.
- C. Manufacturer's Warranty.
- D. Roofing Installer's Warranty.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
- C. Upon completion of the installation, Installer shall provide Sika Corporation with written certification that all work has been done in strict accordance with the contract specifications and Sika Corporation's requirements. A Sika Corporation Technical Service Representative shall review the installed roof system and submit written final acceptance to the General Contractor.
- D. Field quality-control reports.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation and coverboard/substrate board materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation. Water infiltrated (damp or wet) insulation, coverboard, or substrate board shall be removed from the jobsite and replaced with new, fully dry materials.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship due to any failure including but not limited to, damage to roof system caused by winds in excess of 85 mph, within specified warranty period, with no monetary limit (NDL).
 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, and other components of roofing system.
 2. Warranty Period: 20 years, non-prorated, from date of Substantial Completion.
- B. Roofing Installer's Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of 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: Six (6) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain components including roof insulation fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed 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. Roofing and base flashings shall remain watertight.
 - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7 and using wind load values indicated on the Structural Drawings.
- D. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- E. Solar Reflectance Index: Roofing system shall have an initial solar reflectance of not less than 0.83, emittance of 0.90, and solar reflective index (SRI) of 104 (ENERGY STAR listed).
- F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class B; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 SINGLE-PLY ROOFING

- A. PVC Sheet (SPMR): ASTM D 4434 (latest version), "Standard for Polyvinyl Chloride Sheet Roofing". Classification: Type III.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Sika Sarnafil; S327 for mechanically attached applications.
 - 2. Thickness: 60 mils, nominal.
 - a. 48 mil thick SPMR where membrane upturns onto rising walls and parapets.
 - 3. Exposed Face Color: EnergySmart White.

2.4 FLASHING MATERIALS

A. Wall/Curb Flashing:

1. Sarnafil S327 Membrane: Fiberglass reinforced membrane adhered to approved substrate using "Sarnacol" adhesive.
2. Metal Flashing: Sarnafil "Sarnaclad" PVC-coated, heat weldable sheet metal formed into shapes and profiles as indicated and/or required; 25 gauge, G90 galvanized metal sheet with a 20 mil. unsupported Sarnafil membrane laminated on one side
 - a. Refer to Section 076200 for additional flashing and requirements.

B. Miscellaneous Flashing

1. Pipe Vent Flashing: Prefabricated vent pipe flashing made from 0.048-inch-thick Sarnafil G410 membrane.
2. Corner Flashing: Prefabricated outside and inside flashing corners made of 0.060-inch-thick membrane that are heat-welded to membrane or Sarnafil "Sarnaclad" base flashings.
3. Roof scuppers: Sarnafil Box Scuppers.
4. Multi-Purpose Sealant: Sealant used at flashing terminations.
5. Adhesive: Sarnafil "Sarnacol 2170" solvent-based reactivating-type adhesive used to attach the membrane to flashing substrate.
6. Liquid Flashing (SPLF): Two-component polymethyl methacrylate-based (PMMA).

2.5 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing (SPMF): Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet. Sarnafil G459 for fully adhered flashing applications.
- C. Bonding Adhesives: Manufacturer's standard.
- D. Slip Sheet: Manufacturer's standard, of thickness required for application.
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8-inch-thick; with anchors.
- F. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1-inch-wide by 0.05 inch thick, prepunched.
- G. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.

- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.
- I. Sealant: Manufacturer approved sealant such as Sikaflex-1a or equal, as approved for direct contact with single ply membranes.
- J. Single Ply Membrane Flashing (SPMF): PVC coated clad metal, 24 ga. (used where single ply membrane is heat welded over metal flashing).

2.6 SUBSTRATE BOARDS

- A. Substrate Board (SSBD): ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 5/8-inch-thick.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Building Products; DensDeck Prime.
- B. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.

2.7 VAPOR RETARDER

- A. Modified Bituminous Vapor Retarder (MBVR): Self-adhesive SBS polymer modified bitumen with a non-woven polyester mat reinforcement and fine mineral aggregate (sand) topside. The self-adhesive underside is covered by a protective release liner that is removed during application. Provide primer when recommended by manufacturer.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Sika Sarnafil; Vapor Retarder SA 106 (all laps heat welded).

2.8 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
- B. Polyisocyanurate Board Insulation (RRI): ASTM C 1289, Type II, Class 2, Grade 2, premium performance coated glass facers (no organic or paper facers allowed), 20 psi.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Sika Sarnafil, Sarnatherm CG polyisocyanurate board or comparable product by one of the following:
 - a. Carlisle SynTec Incorporated.
 - b. Johns Manville; a Berkshire Hathaway company.
- C. Roof Insulation: Constant thickness and tapered, square edged. Fully adhered insulation boards shall be no larger than 4'x4'.

- D. Thermal Value: Required overall average R-Value for roof insulation is identified on Building Insulation Schedule located on Sheet A3.40.
- E. Tapered Insulation (TI): Provide factory-tapered insulation boards fabricated to slope for positive drainage and as required by membrane roofing manufacturer.
- F. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.9 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- D. Wood Nailer Strips: Comply with requirements in Section 061000 "Rough Carpentry."
- E. Cover Board (CBD): ASTM C 1177, glass-mat, water-resistant gypsum substrate, 1/4-inch-thick, factory primed.

2.10 WALKWAYS

- A. Walkway Pads: Sarnafil "Sarnapad" 1/4" thick, injection-molded, slip resisting surface textured walkway pad with welding tabs. Install continuous rooftop walkway network in accordance with layout shown on drawings.
 - 1. Maintain drainage around walkway pads.
 - 2. Install walkway pads underneath all sheet metal splash pans as shown on Drawings.

2.11 ASPHALT MATERIALS (for Vapor Retarder/Temporary Roof)

- A. Asphalt Primer: ASTM D 41/D 41M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
4. Verify that roof deck substrate, including all wood blocking, is dry and free of moisture.

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

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Install insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing. All seams shall be heat welded before leaving the job site that day.

3.4 SUBSTRATE BOARD INSTALLATION

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.5 VAPOR-RETARDER INSTALLATION

- A. Modified Bituminous Vapor Retarder: Prime substrate if recommended by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder. Align successive sheets with 3-inch side laps and 6-inch end laps. Fully heat weld all sidelaps and endlaps, roll the seam area to ensure full contact.

- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement and moisture infiltration into roofing system.

3.6 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction. Do not allow any single layer of insulation to be greater than 2.7 inches in thickness.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Loose Lay Insulation: Loose lay each layer of insulation in accordance with the manufacturer's installation instructions.

3.7 COVERBOARD INSTALLATION

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
- B. Coverboard shall be neatly cut to fit around penetrations and projections.
- C. Do not install more coverboard than can be covered with membrane by the end of the day or the onset of inclement weather.
- D. Install slip sheet over cover board (if required by the manufacturer) and immediately beneath roofing.

3.8 MECHANICALLY FASTENED ROOFING INSTALLATION

- A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.
 - 1. Install sheet according to ASTM D 5082.
 - 2. For in-splice attachment, install roofing with long dimension perpendicular to steel roof deck flutes.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Mechanically fasten or adhere roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Apply roofing with side laps shingled with slope of roof deck where possible.
- F. In-Seam Attachment: Secure one edge of PVC sheet using fastening plates or metal battens centered within seam, and mechanically fasten PVC sheet to roof deck.
- G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.
- I. Plates:
 - 1. Place plates in grid pattern on roof insulation in accordance with thermoplastic membrane roofing section.
 - 2. Install required number of plates and fasteners per 4-foot by 8-foot insulation/coverboard to achieve membrane roofing manufacturer's required FM rating.
 - 3. Install plates in straight rows in at least 1 direction in accordance with membrane roofing manufacturer's prescriptive fastening patterns for roof field, perimeter, and corners. Plates may need to be adjusted slightly in order to hit top flutes of roof deck.
 - 4. Secure plates in accordance with membrane roofing manufacturer's prescriptive fastening patterns for roof field, perimeter and corners.
 - 5. Do not overdrive fasteners on plates.
 - 6. Install plates and fasteners tight and flat to roof insulation with no dimpling of insulation board, or coverboard surface.
- J. Lay membrane roofing over roof insulation and fastened plates in accordance with thermoplastic membrane roofing section.

K. Calibration of Induction Welding Tools:

1. Calibrate each induction welding tool in accordance with membrane roofing manufacturer's instructions to appropriate level for site conditions.
2. Adjust induction welding tools to achieve maximum bond strength based on ambient temperature from 0 to 120 degrees F.
3. Recalibrate induction welding tools whenever ambient temperature changes up or down by 15 degrees F.
4. Adjust energy level of induction welding tools in accordance with membrane roofing manufacturer's instructions to produce optimal bond.
5. Optimal Bond: 100 percent bond.

L. Bonding Membrane Roofing:

1. Operate calibrated induction welding tools and magnetic cooling clamps in accordance with membrane roofing manufacturer's instructions. Keep bottom of magnetic cooling clamps clean from debris with a clean cotton rag.
2. Ensure induction welding tools are centered over plates.
3. Create 100 percent bond between underside of membrane roofing and top of plates.
4. Ensure total, even, consistent adhesion of membrane roofing to top of plates.
5. Partial Bond of Membrane Roofing to Plates: Not acceptable.

M. Weld Tests:

1. Test welds to determine adhesion of underside of membrane roofing to top of plates.
2. Test welds in accordance with membrane roofing manufacturer's instructions.
3. Notify Architect of welds that do not have optimal bond.

3.9 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.10 METAL FLASHINGS

- A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:

1. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) – latest issue.
 2. Sarnafil Inc. written recommendations.
- B. Metal Base Flashings/Edge Metal: Sarnafil “Sarnaclad” metal flashings shall be formed and installed per reviewed shop drawings and architectural drawings:
1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4-inches on center, staggered. Fasteners shall penetrate the nailer a minimum of 1-inch.
 2. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.
- C. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.
- D. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.
- E. Metal joints shall be watertight.
- F. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1-inch.
- G. Counter flashings shall overlap base flashings at least 4-inches.
- H. Hook strips shall extend past wood nailers over wall surfaces by 1-1/2-inch minimum and shall be securely sealed from air entry.

3.11 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.
1. Electric Field Vector Mapping (EFVM): Testing agency shall survey entire roof area for potential leaks using electric field vector mapping (EFVM).
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.13 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.14 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: **<Insert name of Owner>**.
 - 2. Address: **<Insert address>**.
 - 3. Building Name/Type: **<Insert information>**.
 - 4. Address: **<Insert address>**.
 - 5. Area of Work: **<Insert information>**.
 - 6. Acceptance Date: _____.
 - 7. Warranty Period: **<Insert time>**.
 - 8. Expiration Date: _____.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding **<Insert mph>**;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

- e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
 7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075419

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. Formed roof-drainage sheet metal fabrications.
- 2. Formed wall sheet metal fabrications.
- 3. Formed equipment support flashing.
- 4. Underlayment materials for sheet metal flashings.

- B. Key Abbreviations include the following:

- 1. DSS Downspout Strainers
- 2. F&SM Flashing & Sheet Metal
- 3. SMSP Sheet Metal Splash Plan

- C. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for PVC downspouts.
- 2. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
- 3. Section 074213 "Metal Wall Panels" for sheet metal flashing and trim integral with metal wall panels.
- 4. Section 075419 "Single-Ply Membrane Roofing" for vent pipe flashings, underlayment and installation of sheet metal flashing and trim integral with roofing.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".
 - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 - 3. Review requirements for insurance and certificates if applicable.

4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Sustainable Design Submittals:
 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- C. Shop Drawings: For sheet metal flashing and trim.
 1. Include plans, elevations, sections, and attachment details.
 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 6. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 7. Include details of roof-penetration flashing.
 8. Include details of edge conditions and counter-flashings as applicable.
 9. Include details of special conditions.
 10. Include details of connections to adjoining work.
 11. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.
- D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

- D. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
 - 1. Wind Zone: As noted on Drawings – General Structural Notes.
- E. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.
- G. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

2.2 SHEET METALS (F&SM)

- A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Protective coating conforming to ASTM A924/A792 AZ50 Zincalume or Galvalume comprised of 45% zinc and 55% aluminum by weight.
 - 2. Surface: Smooth, flat finish.
 - 3. Exposed Finishes: Apply the following coil coating:
 - a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
 - a) Humidity Resistance: 1000 hours.
 - b) Salt-Spray Resistance: 1000 hours.
 - 4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
 - 5. Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

- B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

- 1. Surface: Smooth, flat.

- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed; with smooth, flat surface.

- 1. Finish: 2D (dull, cold rolled).
 - 2. 24 Gauge, unless otherwise indicated.

2.3 UNDERLAYMENT MATERIALS (Where depicted in the details)

- A. Self Adhering Membrane: Grace Ultra or equivalent.
- B. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.
- C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer. Use S.A.M HT as specified in Section 072500 "Weather Barriers".

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

- 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Material: Stainless Steel unless noted otherwise
 - b. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - c. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

- 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

- C. Solder:

- 1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

2. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2-inch-wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight. SikaFlex 1a or approved.
- F. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- H. Sill Pans:
 1. L-Angle (for Liquid Sill Pan): 1 1/2" .080" anodized aluminum L-angle matching aluminum finish color of opening.
- I. Reglets: Units of type, material and profiles required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same material as reglet.
 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. Fry Reglet Corporation.
 - b. Hickman Company, W.P.
 2. Material: Stainless steel, 0.019-inch-thick, galvanized steel, 0.022 inch thick.
 3. Finish: Mill.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1-inch-deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- G. Do not use graphite pencils to mark metal surfaces.

2.6 SHEET METAL FABRICATIONS (F&SM)

- A. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape detailed, complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
 - 1. Prepainted, Metallic-Coated Steel: 22 gauge.
- B. Copings and Fascia's: Fabricate in minimum 96-inch long, but not exceeding 10-foot long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Coping Profile: SMACNA figure designation 3-4A.
 - 2. Joint Style: Standing Seam.
 - 3. Fabricate from the following materials:
 - a. Prepainted, Metallic-Coated Steel: 22 gauge.
- C. Through Wall Flashing:
 - 1. Prepainted, Metallic-Coated Steel: 24 gauge with 4" bayonet seams and end dams.
- D. Head Flashing:
 - 1. Prepainted, Metallic-Coated Steel: 24 gauge with end dams.
- E. Roof and Roof to Wall Transition: Fabricate from the following materials:

1. Prepainted, Metallic-Coated Steel: 24 gauge.
- F. Base Flashing: Fabricate from the following materials:
1. Prepainted, Metallic-Coated Steel: 24 gauge.
 2. Utilize 24 gauge PVC coated clad metal (SPMF) where heat welding to SPMR (all seams and joints to be fully sealed with heat welded strips of single ply membrane).
- G. Flashing Receivers: Fabricate from the following materials:
1. Prepainted, Metallic-Coated Steel: 24 gauge.
- H. Drip Edges: Fabricate from the following materials:
1. Prepainted, Metallic-Coated Steel: 24 gauge.
- I. Counterflashing: Fabricate from the following materials:
1. Prepainted, Metallic-Coated Steel: 24 gauge.
- J. Cleats: Fabricate from the following materials:
1. Galvanized Steel: 20 gauge.
- K. Saddles and Various Soldered Flashing Transitions: Fabricate from the following materials:
1. AISI 302/304 stainless steel, 4-inch flange minimum: 24 gauge.
 2. Utilize 24 gauge PVC coated clad metal (SPMF) where heat welding to SPMR (all seams and joints to be fully sealed with heat welded strips of single ply membrane).

2.7 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following material:
1. Prepainted, Metallic-Coated Steel: 24 gauge.
- B. Downspout Strainer (DSS): Typical 22-gauge SMACNA downspout strainer (figure 1-24) at each downspout.
- C. Downspout Strap & Bracket: Fabricate from the following material:
1. Prepainted, Metallic-Coated Steel: 16 gauge.
- D. Sheet Metal Splash Pan (SMSP): Fabricate as detailed on the Drawings from the following material:
1. Prepainted, Metallic-Coated Steel: 24 gauge.

2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- B. Synthetic Underlayment: Install synthetic underlayment wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

3.3 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, 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, levels, and slopes. 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 apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24-inches of corner or intersection.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
 - 1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, 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.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants." Provide minimum 4" flashing lap joints sealed with 2 continuous beads of approved sealant.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel sheet.
 2. Do not use torches for soldering.
 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 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.
- B. Splash Pans (SMSP): Install where downspouts discharge on low-sloped roofs. Set in asphalt roofing cement or elastomeric sealant compatible with roofing membrane.
- C. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
- D. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 2-inches below scupper discharge.

3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces for specified wind zone. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 16-inch centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
 2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 20-inch centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4-inches over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches and bed with sealant. Secure in waterproof manner by means of snap-in installation and sealant or anchor and washer at 36-inch centers, unless otherwise indicated.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4-inches beyond wall openings.

3.7 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.

3.8 ERECTION TOLERANCES

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

3.9 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 sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in 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.

END OF SECTION 076200

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: Firestopping systems designed and tested to maintain fire-resistive construction and assemblies in accordance with IBC 2015 edition.
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.
 - 3. Penetrations in smoke barriers.
 - 4. Floor-to-wall joints.
 - 5. Head-of-wall joints.
 - 6. Wall-to-wall joints.
- B. Key Abbreviations include the following:
 - 1. FSTP Firestopping

1.3 REFERENCES

- A. American Society for testing and Materials (ASTM):
 - 1. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E 119 – Standard Test Methods for Building Construction Systems.
 - 3. ASTM E 814 – Standard Test Method for Fire Tests of Through Penetration Firestops.
 - 4. ASTM E 1966 – Standard Test Method for Fire-Resistive Joint Systems.
- B. Underwriters Laboratory (UL) – Fire Resistance Directory:
 - 1. XHBN – Fire Resistive Joint Systems.
 - 2. XHCR – Through Penetrating Devices.
 - 3. BXUV – Fire Resistance Ratings.
 - 4. XHEZ – Through Penetration Firestop Systems.
 - 5. XHHW – Fill, Void, or Cavity Material.
 - 6. XHKU – Forming Materials.
- C. Underwriters Laboratory (UL):
 - 1. UL 1479 – Fire Tests of Through-Penetration Firestops.
 - 2. UL 2079 – Tests for Fire Resistance of Building Joint Systems.

1.4 DEFINITIONS

- A. Refer to Section 702 of 2015 IBC for definitions applicable to this Section. Where definitions conflict, conform to IBC definitions.
- B. F Rating (Flame Rating): Defined by IBC Section 702.1 as time period that penetration firestop system limits passage of fire through penetration as tested in accordance with ASTM E 814 standard testing method.
- C. T Rating (Temperature Rating): Defined by IBC Section 702.1 as the time period that penetration firestop system including penetrating item (such as pipe), limits maximum temperature rise to 325 degrees F above its initial temperature through penetration to non-fire side, as tested in accordance with ASTM E 814 standard testing method.
- D. Intumescent Firestopping: Systems designed to expand, fill, and close off openings to maintain fire-resistive construction where penetrating materials are subject to combustion, melting, or deformation, including materials such as plastic pipe, cable, jacketing, pipe insulation, and sheet metal ductwork.
- E. Endothermic Firestopping: Systems designed to absorb heat transfer through openings penetrated by heat-transmitting, non-combustible materials, including materials such as steel, copper, and cast iron.

1.5 DESIGN REQUIREMENTS

- A. Firestopping Systems: Tested systems as required to maintain fire-resistive rated construction and occupancy separations at penetrations, construction joints, openings, and voids in conformance with 2015 IBC Chapter 7.
- B. Firestopping Materials: Conform to IBC Chapter 7 and associated Standards for fire-resistive rated materials, tested according to ASTM 119 and ASTM E 136 as required to maintain fire-resistive construction. Acceptable to Building Official based upon evidence of fire rating classification.
- C. Construction Joints at Fire Resistive Construction: Provide firestopping systems designed to maintain fire-resistive construction by resisting passage of fire and hot gas while accommodating cyclic movement of firestopping at construction joints in accordance with IBC Section 713.
 - 1. Include:
 - a. Floor-to-floor joint systems.
 - b. Wall-to-wall joint systems.
 - c. Floor-to-wall joint systems.
 - d. Head-of-wall joint systems. Refer to Section 091110 for deflection track systems.
- D. Cyclic movement of Firestopping at Construction Joints: Conform to IBC Section 713, tested ASTM E 1966 / UL 2079 for 500 cycles at minimum rate of 30 cycles per minute.
- E. Through-Penetration and Membrane Firestopping:

1. Provide firestopping to maintain fire-resistive construction at through-penetrations in accordance with IBC Chapter 7.
 2. Conform to IBC Section 712 for firestopping with F (flame) or T (temperature) ratings as necessary to maintain fire-resistive rated construction and assemblies at through-penetration fire stops, tested in accordance with ASTM E 814 or UL 1479.
- F. Walls and Partitions: Conforms to IBC Chapter 7 as necessary to maintain fire-resistive ratings at through-penetrations, membrane penetrations, and construction joints.
- G. Exterior Walls:
1. Provide firestopping at intersection of exterior walls and floor assemblies, including construction joints and voids at exterior wall assemblies, attics, and concealed spaces, conforming to IBC Chapter 7.
 2. Prevent passage of vertical smoke, flame, and hot gases sufficient to ignite cotton waste subject to time-temperature curve under hose stream test conditions conforming to IBC Standards, Section 7.
- H. Floor-Ceilings and Roof-Ceilings: Maintain fire-resistive ratings at openings, penetrations, and construction joints. Conform to IBC, Chapter 7, including Section 711.

1.6 PERFORMANCE REQUIREMENTS

- A. Intumescent Firestopping:
1. Provide systems, including collars and putties, deigned to expand, fill, and close off openings where penetrating materials are subject to combustion, melting, or deformation.
 2. Provide at openings penetrated by plastic pipe, cable, jacketing, pipe insulation, and sheet metal ductwork as necessary to maintain F ratings and T Ratings for fire-resistive construction.
- B. Endothermic Firestopping:
1. Provide systems, such as sealants with mineral wool backing and cement mortars designed to absorb heat transfer.
 2. Provide at openings penetrated by heat-transmitting, non-combustible materials, such as steel, copper, and cast iron as necessary to maintain T Ratings for fire-resistive construction.
 3. Include intumescent properties where applicable to meet additional requirements.
- C. Joints and Penetrations Subject to Movement or Vibration:
1. Provide flexible sealant or moldable putty firestopping systems at permanent endothermic firestopping installations.
 2. Provide collars or putties at intumescent installations.
 3. Do not use cement mortar firestopping systems.
- D. Cement Mortar Firestopping: May be used to reduce large opening areas where intumescent firestopping systems are required or used as a single system where endothermic systems are required and where no vibration or movement of joints and penetrating materials occur.

- E. Mortars and Sealants: Must not shrink, become brittle, crack, pull back from contact surfaces, or dissolve in water after curing.
- F. Pillow Firestopping:
 - 1. Definition: Dust free pillows, impervious to water, humidity, frost, and UV, containing intumescent firestopping material designed to fill large openings and penetrations.
 - 2. May be used where wall opening area is not subject to permanent closure, such as where penetrating cables and pipes are subject to additions, removals, or replacement.
 - 3. Do not use in finished room areas without prior approval from Architect.
- G. Fire Blocks:
 - 1. Definition: ready-to-use, two component polyurethane foam intumescent flexible blocks designed to fill large openings and penetrations. Also suitable for some small openings. May be cut to size.
 - 2. May be used where wall opening area is not subject to permanent closure, such as where penetrating cables and pipes are subject to additions, removals, or replacement.
 - 3. Do not use in finished room areas without prior approval from Architect.
 - 4. Cast-In-Firestopping Devices: Injection molded plastic insert with integral intumescent insert or collar designed for casting into concrete slabs at through-penetrations of pipes. Include plastic top and bottom closure caps.
- H. Paintability: Provide paintable firestopping at exposed surfaces designated to receive paint, adhesive coatings, and other finish applications. Do not use silicon sealants.
- I. Restoration Characteristics: Firestopping must be removable and repairable, allowing restoration of construction where penetration materials may be removed.
- J. Hazardous Material Content: Free of asbestos, solvents containing high volatile organic compound (VOC) content, and other hazardous substances.
- K. Fire-Resistance Rating of Fire Stop Components:
 - 1. Flame Spread Rating; Less than 20, tested ASTM E 84.
 - 2. Must not contribute to combustion.
- L. Provide fire-resistive joint systems that are 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 assembly in which fire-resistive joint systems are installed.
- M. Joint Systems in and between Fire-resistance-rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire resistance ratings of construction that they join, and with movement capabilities indicated as determined by UL 2079.
 - 1. Load-bearing capabilities as determined by evaluation during the time of test.
- N. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Test Data:
 - 1. Tested assembly conforming to ASTM E 814, UL 1479, UL 2079, UL Fire Resistance Directory Test, or comparable Warnock Hersey testing data for each firestopping system anticipated.
 - 2. Include test for firestopping systems installed into construction joints and penetrations subject to cyclic or other independent movement.
- C. Shop Drawings: Details for each firestopping location illustrating tested assembly. Standard details are acceptable with location drawings.
- D. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
 - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.
- C. Manufacturer's Installation Instructions: Include procedures for each condition anticipated.

1.9 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.10 QUALITY ASSURANCE

- A. Installer Single Source Firestopping Responsibility at Fire-Resistive Assemblies:
 - 1. Construction Joint and Voids: Provide firestopping by or under direct responsibility of single subcontracting installer.
 - 2. Penetration Firestopping: Provide firestopping by or under direct responsibility of single subcontracting installer for mechanical, electrical, fire protection, and other through-penetration firestopping installers.

3. Same installer is preferred but not required to be responsible for both penetration firestopping and construction joint firestopping.
- B. Firestopping systems from more than one manufacturer are permitted for Work of this Contract under condition that same manufacturer and product is used consistently for each firestopping condition.
 1. Do not install firestopping systems from more than one manufacturer for same firestopping condition.
 2. Do not allow firestopping systems from different manufacturers to contact one another.
- C. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 1. Penetration firestopping tests are performed by UL.
 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.

1.11 COORDINATION, SCHEDULING, AND SEQUENCING

- A. Section 092216 and Section 054000 for construction joints of metal framed wall construction and steel deck with other construction including head of wall firestopping/deflection track options.
- B. Section 092900 for gypsum board wall systems. Sequence firestopping to precede gypsum board taping and finish systems such as painting.
- C. Divisions 22, 23 and Divisions 26 for Mechanical, electrical and fire protection firestopping requirements for penetrating through fire-resistive construction.

1.12 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The following manufacturer's products conforming to specified requirements are accepted for work of this section:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. RectorSeal.
 - d. Specified Technologies, Inc.
 - e. Tremco, Inc.

2.2 PENETRATION FIRESTOPPING SYSTEMS (FSTP)

- A. Penetration Firestopping Systems: Systems that resist spread of fire, 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: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least one 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: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- F. 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.
- G. 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 system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

2.3 FIRESTOPPING MATERIALS

- A. Provide materials as necessary to provide firestopping of penetrations, joints, and openings in fire-resistive construction, assemblies, and occupancy separations, in accordance to manufacturer's instructions and to conform to Regulatory Requirements.
- B. Include mortars, sealants, putties, collars, wrap strips, pillows, and accessories as applicable to complete firestopping system.

2.4 FIRE-RESISTIVE JOINT SYSTEMS

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 - EXECUTION

3.1 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.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately 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 materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.

- B. 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.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- 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.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 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.
- D. Install designed and tested firestopping systems as required to prevent passage of flames, hot gases, and excessive heat from passing through openings, penetrations and joints.
- E. Maintain fire-resistive construction and assemblies in accordance with provisions of this Section and IBC Chapter 7.
 - 1. Provide firestopping systems at ducts, pipes, conduits, sleeves penetrating fire-resistive construction.
 - 2. Provide firestopping systems at construction joints, voids and other openings at fire-resistive construction.
- F. Intersections of Exterior Walls with Fire-Resistive Floors and Floor/Ceiling Assemblies: Firestop to restrict passage of smoke, flame, and hot gases, conform to UBC Chapter 7.
- G. Construction Joints at Fire-Resistive Rated Walls and Floors: Firestop to conform to IBC Chapter 7.
- H. Through Penetrations and membrane Penetrations of Fire-Resistive Rated Walls: Firestop to conform to IBC Chapter 7.
- I. Openings and Penetrations in Fire-Resistive Floors and Floor-Ceiling Assemblies: Firestop to conform to IBC Chapter 7.
- J. Openings into Shaft enclosures: Firestop to conform to IBC Chapter 7.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. 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.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY

- A. The City of Kenmore will inspect through-penetration firestops.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 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 system 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 systems are 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 material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

3.8 FIRE-RESISTIVE JOINT SYSTEMS

- A. Designation System for Joints in or between Fire-Resistance-Rated Constructions: Alphanumeric Systems listed in UL's "Fire Resistance Directory" under Product Category XHBN.
- B. Floor-to-Wall Fire-Resistive Joint Systems:
 - 1. Available UL-Classified Systems: FW-D series.
 - 2. Assembly rating: As required by fire-rated assembly.
 - 3. Nominal Joint Width: As indicated.
- C. Head-of-Wall Fire Resistive Joint Systems:
 - 1. Available UL-Classified Systems: HW-D series.
 - 2. Assembly rating: As required by fire-rated assembly.
 - 3. Nominal Joint Width: As indicated.
- D. Wall-to-Wall Fire Resistive Joint Systems:
 - 1. Available UL-Classified Systems: WW-D series.
 - 2. Assembly rating: As required by fire-rated assembly.
 - 3. Nominal Joint Width: As indicated.

END OF SECTION 078413

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. This Section includes joint sealants for the following applications, including those specified by reference to this Section:

1. Exterior joints in horizontal non-traffic surfaces and the following vertical surfaces:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between metal panels.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
 - e. Other joints as indicated.
2. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
 - e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - f. Other joints as indicated.
3. Interior joints in the following horizontal traffic surfaces:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
4. Exterior and interior joint sealant systems installed with pressure gun.
5. Backer rod as required for hourglass shaped geometry at open joints subject to water penetration. Not required at bedding for thresholds, sheet metal lap seams, paintable interior joints using latex sealants, concealed sealants at gypsum board.
6. Precompressed foam joint sealant backup sealant at rainscreen weather joints.

- B. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Immersible joint sealants.

5. Mildew-resistant joint sealants.
6. Latex joint sealants.

C. Key Abbreviations include the following:

1. AJS Acoustical Joint Sealant
2. JS Joint Sealant
3. WJS Weatherproof Joint Sealant

D. Related Requirements:

1. Section 078413 "Penetration Firestopping" for sealing joints in fire-resistance-rated construction.
2. Section 088000 "Glazing" for glazing sealants.
3. Section 092900 "Gypsum Board" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
4. Section 093013 "Ceramic Tile" for sealing tile joints.
5. Section 321216 "Asphalt Concrete Paving" for sealing joints in pavements.
6. Section 321313 "Concrete Paving Curbs and Walks" for sealing joints in walkways and curbing.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.
- C. All sealants shall be validated and approved by the Sealant Waterproofing and Restoration Institute (SWRI).
- D. Sealant and Self-Adhesive Membrane combinations shall be sent to sealant manufacturer for adhesion certification prior to construction. See Section 072500 for Self-Adhesive Membrane.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
 1. 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports.
- B. Preconstruction Laboratory Test Reports.
- C. Preconstruction Field-Adhesion-Test Reports.
- D. Field-Adhesion-Test Reports.
- E. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- F. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.
- G. Sample Warranties.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period:

- a. Ten years from date of Substantial Completion.
 - b. Twenty years from date of Substantial Completion for silicone products.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, 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:
 - 1. Architectural sealants shall have a VOC content of 250 g/L or less.
 - 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
 - 3. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.
- C. Low-Emitting Interior Sealants: Sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health's (formerly, the California Department of Health Services) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 ELASTOMERIC JOINT SEALANTS (JS)

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for the Project.

- C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- D. Multicomponent Pourable Polysulfide Sealant:
 - 1. Products:
 - a. Meadows, W.R., Inc.; Deck-O-Seal.
 - b. Pacific Polymers, Inc.; Elastoseal 227 Type I (Pourable).
 - 2. Type and Grade: M (multicomponent) and P (pourable).
 - 3. Class: 25.
 - 4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
 - 5. Uses Related to Joint Substrates: M.
- E. Single-Component Pourable Neutral-Curing Silicone Sealant:
 - 1. Products:
 - a. Dow Corning Corporation; 890-SL.
 - b. Pecora Corporation; 300 Pavement Sealant (self leveling).
 - c. Dow Corporation; SL Parking Structure Sealant.
 - 2. Type and Grade: S (single component) and P (pourable).
 - 3. Class: 100/50.
 - 4. Uses Related to exposure; NT and T (traffic).
 - 5. Uses Related to Joint Substrates: M, O, as applicable to joint substrates indicated.
 - a. Use O Joint Substrates: Galvanized steel.
- F. Single-Component Neutral- and Basic-Curing Silicone Sealant:
 - 1. Products:
 - a. Dow Corning Corporation; 790.
 - b. GE Silicones; SilPruf LM SCS2700.
 - c. Tremco; Spectrem 1 (basic).
 - d. GE Silicones; SilPruf SCS2000.
 - e. Pecora Corporation; 864.
 - f. Pecora Corporation; 890.
 - g. Polymeric Systems Inc.; PSI-641.
 - h. Sonneborn, Division of ChemRex Inc.; Omniseal.
 - i. Tremco; Spectrem 3.
 - j. Dow Corning Corporation; 791.
 - k. Dow Corning Corporation; 795.
 - l. GE Silicones; SilPruf NB SCS9000.
 - m. GE Silicones; UltraPruf II SCS2900.
 - n. Pecora Corporation; 865.
 - o. Pecora Corporation; 895.
 - p. Pecora Corporation; 898.
 - 2. Type and Grade: S (single component) and NS (nonsag)

3. Class: 50.
 4. Use Related to Exposure: NT (nontraffic).
 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Galvanized steel, brick and ceramic tile.
 6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
- G. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:
1. Products:
 - a. Pecora Corporation; 898.
 - b. Tremco, Tremsil 600 White.
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 25.
 4. Use Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Galvanized steel and ceramic tile.
- H. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:
1. Products:
 - a. Dow Corning Corporation, 786 Mildew Resistant.
 - b. GE Silicones; Sanitary SCS1700.
 - c. Tremco; Tremsil 200.
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 25.
 4. Use Related to Exposure: NT (nontraffic).
 5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrate: Ceramic Tile.
- I. Multicomponent Nonsag Urethane Sealant:
1. Products:
 - a. Sika Corporation, inc.; Sikaflex-2c NS TG.
 - b. Sonneborn, Division of ChemRex Inc.; NP 2.
 - c. Tremco; Vulkem 322 DS or Dymeric.
 - d. Bostik Findley; Chem-Calk 500.
 - e. Polymeric Systems Inc.; PSI-270.
 2. Type and Grade: M (multicomponent) and NS (nonsag).
 3. Class: 25.

4. Use Related to Exposure: T (traffic).
5. Uses related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Galvanized steel, brick and ceramic tile.

J. Multicomponent Pourable Urethane Sealant:

1. Products:
 - a. Bostik Findley; Chem-Calk 550.
 - b. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type I (self leveling).
 - c. Pacific Polymers, inc. Elasto-Thane 227 Type I (self leveling).
 - d. Pecora Corporation; Urexpan NR-200.
 - e. Polymeric Systems, inc.; PSI-270SL.
 - f. Tremco; THC-901.
 - g. Tremco; THC-900.
 - h. Tremco; Vulkem 245.
 - i. Pecora Corporation; Urexpan NR 300, Type H.
 - j. Pecora Corporation; Urexpan NR 300, Type M.
2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Galvanized steel and brick.

2.3 SOLVENT-RELEASE JOINT SEALANTS (JS)

A. Butyl-Rubber-Based Solvent-release Joint Sealant: Comply with ASTM C 1085.

1. Products:
 - a. Bostik Findley; Bostik 300.
 - b. Fuller, H.B. Company; SC-0296.
 - c. Fuller, H.B. Company, SC-0288.
 - d. Pecora Corporation; BC-158.
 - e. Polymeric Systems inc.; PSI-301.
 - f. Sonneborn, Division of ChemRex, Inc.; Sonneborn Multi-Purpose Sealant.
 - g. Tremco; Tremco Butyl Sealant.

2.4 LATEX JOINT SEALANTS (JS)

A. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.

B. Products:

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.

3. Sonneborn, Division of ChemRex, Inc.; Sonolac.
4. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS (AJS)

- A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.
 1. 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.
 2. Product:
 - a. Pecora Corporation; BA-98.
 - b. Tremco; Tremco Acoustical Sealant.

2.6 PREFORMED TAPE SEALANTS

- A. Back-Bedding Mastic Tape Sealant: Preformed, butyl-based elastomeric tape sealant with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape manufacturer for application indicated; packaged on rolls with a release paper backing 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 applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Tape Sealant: Closed-cell, PVC foam tape sealant; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
 1. Type 1, for applications in which tape acts as the primary sealant.
 2. Type 2, for applications in which tape is used in combination with a full bead of liquid sealant.

2.7 BUILDING ENVELOPE SEALANTS (WJS)

- A. Sealant 1
 1. Dow Corning; DC 791 Silicone (weatherproofing sealant).
- B. Sealant 2
 1. Dow Corning; 758 Silicone (for sheet goods WRB).
- C. Sealant 4
 1. Dow Corning; 795 Silicone (storefront & curtainwall windows).

D. Sealant 5

1. Dow Corning; 758 Silicone (used at WRB laps and penetrations to complete air barrier).

E. Sealant 6

1. Sika Corporation; Sikaflex 2c SL (self-leveling, used at sidewalk and fill base of posts/railings).

2.8 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg. F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 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 performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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. Concrete.
 - b. 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. Glazed surfaces of ceramic 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.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications 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 Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
 - 4. Provide flush joint profile at locations indicated according to Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated according to Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Installation of Preformed Tapes: Install according to manufacturer's written instructions.
- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

3.4 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 of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- 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.

3.5 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.

3.6 PROTECTION

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

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior vertical construction joints in cast-in-place concrete.
 - 1. Joint Sealant: Single-component neutral- and basic-curing silicone sealant or multicomponent nonsag urethane sealant.
- B. Joint-Sealant Application: Exterior horizontal nontraffic and traffic isolation and contraction joints in cast-in-place concrete slabs.
 - 1. Joint Sealant: Multicomponent pourable polysulfide sealant, Multicomponent nonsag urethane sealant or Multicomponent pourable urethane sealant.
- C. Joint-Sealant Application: Exterior vertical and horizontal nontraffic joints between plant-pre-cast architectural concrete units.

1. Joint Sealant: Single-component neutral- and basic-curing silicone sealant.
- D. Joint-Sealant Application: Exterior butt joints between metal panels.
 1. Joint Sealant: Single-component neutral- and basic-curing silicone sealant or multicomponent nonsag urethane sealant.
- E. Joint-Sealant Application: Exterior vertical joints between different materials listed above.
 1. Joint Sealant: Single-compartment neutral- and basic-curing silicone sealant or multicomponent nonsag urethane sealant.
- F. Joint-Sealant Application: Exterior perimeter joints between connecting metal and frames of doors, windows, and louvers.
 1. Joint Sealant: Single-component neutral- and basic-curing silicone sealant or multicomponent nonsag urethane sealant.
- G. Joint-Sealant Application: Vertical control and expansion joints on exposed interior surfaces or exterior walls.
 1. Joint Sealant: Single-component neutral- and basic-curing silicone sealant or multicomponent nonsag urethane sealant.
- H. Joint-Sealant Application: Interior perimeter joints of exterior openings.
 1. Joint Sealant: Single-component neutral- and basic-curing silicone sealant or multicomponent nonsag urethane sealant.
- I. Joint-Sealant Application: Interior ceramic tile expansion, control contraction, and isolation joints in horizontal traffic surfaces.
 1. Joint Sealant: Multicomponent pourable urethane sealant.
- J. Joint-Sealant Application: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
 1. Joint Sealant: Single-component mildew-resistant neutral or acid-curing silicone sealant.
- K. Joint-Sealant Application: Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 1. Joint Sealant: Latex sealant
- L. Joint-Sealant Application: interior control, expansion, and isolation joints in horizontal traffic surfaces of concrete flooring.
 1. Joint Sealant: Multicomponent nonsag urethane sealant or multicomponent pourable urethane sealant.

END OF SECTION 079200

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. Interior floor expansion control systems.
- B. Key Abbreviations include the following:
 - 1. EJC Expansion Joint Cover (EJC-#)

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.
- B. Shop Drawings: For each expansion joint cover assembly.
 - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7, and per Structural General Notes.
- B. Expansion Joint Design Criteria:

- a. Joint Movement: As indicated on Drawings.

2.3 EXTERIOR EXPANSION CONTROL SYSTEMS (EJC)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated, or a comparable product by one of the following:
 - 1. Architectural Art Mfg., Inc.; Division of Pittcon Industries.
 - 2. Balco, Inc.
 - 3. EMSEAL Corporation.
 - 4. JointMaster/InPro Corporation.
 - 5. Michael Rizza Company, LLC.
 - 6. MM Systems Corporation.
 - 7. Nystrom, Inc.
 - 8. Watson Bowman Acme Corp.; a BASF Construction Chemicals business.
- B. Source Limitations: Obtain expansion control systems from single source from single manufacturer.
- C. Floor-to-Floor:
 - 1. Basis-of-Design Product: Balco, Inc., Gymnasium Floor System, QA100 & AB3X316.
 - 2. Design Criteria:
 - a. Nominal Joint Width: As indicated on Drawings.
 - b. Minimum Joint Width: As indicated on Drawings.
 - c. Maximum Joint Width: As indicated on Drawings.
 - d. Movement Capability: -50 percent/+50 percent.
 - e. Type of Movement: Joint.

2.4 MATERIALS

- A. Aluminum: ASTM B 221M, Alloy 6063-T5 for extrusions; ASTM B 209M, Alloy 6061-T6 for sheet and plate.
 - 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Moisture Barrier: Manufacturer's standard, secondary seal/vapor barrier fabricated from flexible elastomeric material.
- D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 GENERAL FINISH REQUIREMENTS

- 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.

2.6 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 - 1. Color: Black.

2.7 ACCESSORIES

- A. Manufacturer's standard attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.
- B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- B. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- C. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates and install temporary protection over expansion joint cover assemblies. Reinstall cover plates prior to Substantial Completion.

END OF SECTION 07 95 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes hollow-metal work.
- B. Key Abbreviations include the following:
 - 1. H Hollow Metal (at Schedule)
 - 2. HMD Hollow Metal Door
 - 3. HMF Hollow Metal Frame
 - 4. R Hollow Metal (at relite tags)
- C. Related Requirements:
 - 1. Section 072100 "Thermal Insulation" For Air Barrier Foam and Foamed-in-Place Insulation applied at Hollow Metal Frames as detailed.
 - 2. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
 - 3. Section 088000 "Glazing" for glazed lites in steel doors and frames.
 - 4. Section 081114 "Custom Hollow Metal Doors and Frames" for custom fabricated secret passage door.
 - 5. Section 099113 "Exterior Painting" for field painting steel doors and frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate access for conduit at door heads (as required) for running security wiring at all exterior doors and any interior doors which will be monitored.

1.5 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, core descriptions, label compliance, fire-resistance ratings, temperature-rise ratings, and finishes for each type of hollow metal door and frame.
- B. Shop Drawings: Include the following:
1. Elevations of each door type.
 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, joints, field splices, and connections.
 7. Details of accessories.
 8. Details of moldings, removable stops, and glazing.
 9. Details of conduit and preparations for power, signal, and control systems.
- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.
- B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
- C. Manufacturer's Installation Instructions: Include special installation instructions. Transmit one copy of instructions to Installer.

1.7 QUALITY ASSURANCE

- A. Manufacturer: Member of Steel Door Institute (SDI) or Hollow Metal Manufacturers Association (HMMA).
- B. Laboratory Test Reports: All doors should be pre-tested by the manufacturer to design conditions.
- C. Field Testing:
 1. A hollow-metal door and frame mockup will be water intrusion tested in field to given parameters. Mockup may be created in situ or be free standing as determined by Weatherization Consultant. All mockups must pass Water Resistance Field Test Pressures.
 2. All sealant dependent installations require adhesion test performed on site by contractor. Adhesion test logs shall be submitted to the Architect for review.

1.8 REGULATORY REQUIREMENTS

A. Smoke- and Draft-Control Assemblies:

1. Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
2. Conform to IBC Chapter 7 for Fire Label bearing fire rating identification followed by letter S.

B. Fire Rated Door Assemblies:

1. Doors and Frames: Fire Labeled by UL, WHI or other ICBO approved testing agency.
2. Wall Openings Assemblies to Retard Passage of Fire: Conform to IBC Chapter 7 and UL 10C for Fire Label bearing fire rating identification of positive pressure tested door assemblies.
3. Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Protect doors, frames, and finish to prevent rust and damage.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.10 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.11 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to the project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door; ASSA ABLOY.
 - 2. Curries Company; ASSA ABLOY.
 - 3. Republic Doors and Frames.
 - 4. Steelcraft; an Allegion brand.
 - 5. Stiles Custom Metal, Inc.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR DOORS AND FRAMES (H), (HMD), (HMF)

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door, Frame and Hardware Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
 - d. Edge Construction: Model 2, Seamless.
 - e. Core: Manufacturer's standard.
 - 3. Frames:
 - a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
 - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Face welded.
 - 4. Exposed Finish: Prime.

2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES (H), (HMD), (HMF)

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

1. Doors:
 - a. Type: As indicated in the Door, Frame and Hardware Schedule.
 - b. Thickness: 1-3/4 inches
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
 - d. Edge Construction: Model 2, Seamless.
 - e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - f. Core: Fiberglass or mineral wool insulation, 0.75 pound density.
 - 1) Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than R 2.7 per ASTM C 1363.
2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
 - b. Construction: Face welded, ground smooth, and filled.
3. Exposed Finish: Prime.

2.4 BORROWED LITES

- A. Hollow-metal frames of metallic-coated steel sheet, minimum thickness of 0.042 inch.
- B. Construction: Face welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 2. Postinstalled Type for In-Place: Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 2. Concrete Topping Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- C. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Grout: Do not solid grout frames.
- F. Glazing: Comply with requirements in Section 088000 "Glazing."
- G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- H. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8" high unless otherwise indicated.

2.7 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026-inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
 - 2. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
 - 3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
 - 4. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
 - 5. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
 - 6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - 7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

- 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. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor.
 4. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - b. Compression Type: Not less than two anchors in each frame.
 - c. Post installed Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 5. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Fabricate concealed stiffeners and edge channels 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 SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers 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 outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.9 ACCESSORIES

- A. Hardware Mullions: Removable mullions are required for double doors as specified. Specify and coordinate with door hardware specification section.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors.
 - 3. Metal-Stud Partitions: Prior to installation, completely fill hollow metal frames with Sprayfoam insulation (FIPI) as specified in Section 072100. Seal with Air Barrier Foam (ABF) as specified in Section 072100 and detailed.
 - 4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. 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.
- C. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

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 a set of secret passage doors disguised into a wall of acoustic diffusers at the back of the platform in the Concert Hall.
- B. Key Abbreviations include the following:
 - 1. CDA Concealed Door Assembly
- C. Related Requirements:
 - 1. Section "098400 One-Dimensional Diffuser" for coordination of diffusers to be mounted to concealed door assembly.

1.3 ACTION SUBMITTALS

- A. Shop Drawings:
 - 1. Include elevation and plan views with all relevant dimensions.
 - 2. Provide isometric (3D) views illustrating how the finished project will work and look.
 - 3. Include required wall condition drawings to ensure correct preparation of the door opening and easy installation.
 - 4. Include callouts for electrical requirements where applicable.
- B. Delegated-Design Submittal: For concealed door assembly taking into account material properties, load ratings and design tolerances resulting in a concealed door of superior appearance and functionality.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For concealed door to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Creative Home Engineering; Custom Secret Passage Doorway; 1325 N Melba Ct., Gilbert, AZ 85233, 480-899-3477, or comparable product by one of the following:

1. Approved Equal.

2.2 ASSEMBLY DESCRIPTION

- A. Fully boxed tubular steel door chassis with integrates steel door frame for rigidity, durability and adjustability.
- B. Hinge Configuration: Double doors.
- C. Swing Direction: In-swing (Doors swing into Backstage Storage as they open).
1. 180-degree open angle on both doors.
- D. Minimum Clear Dimensions: As detailed on Sheet A4.45.
- E. Patented remote 5-axis adjustable hinging system.
- F. Included door stops.
- G. Operation: Manual.
1. The doors will be pushed open and pulled closed manually. A mechanical deadbolt to be provided to lock and unlock the doors from the Backstage Storage side only.
- H. No tracks, casters or floor rollers.
- I. Durable powder-coated interior finish (color TBD).
- J. Real Acoustix Realquad Studio 250 diffusers provided by others to concealed door manufacturer for application.

2.3 CUSTOM MANUFACTURE / STRUCTURAL METALWORK

- A. The concealed door system will incorporate a variety of concealed precision structural steel and aluminum components that must be robotically cut and then hand manufactured to meet the specific requirements unique to this door to ensure that no sagging, warping or rubbing occur in the finished product.

2.4 LIFE CYCLE TESTING

- A. The concealed door assembly to be pre-assembled and mounted in a customized test jig designed to simulate the rough opening conditions at the job site. The assembly to then be cycled 200 times while periodically being inspected for signs of wear. Release for delivery once the manufacturer has certified that no signs of wear were observed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation to be performed by the General Contractor. Manufacturer to provide unlimited free telephone technical support to ensure a successful installation.

END OF SECTION 081114

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. Solid-core doors with wood-veneer faces.
 - 2. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors to frame and factory machining for hardware.
- B. Key Abbreviations include the following:
 - 1. W Wood Door (at Schedule)
- C. Related Requirements:
 - 1. Section 081113 "Hollow Metal Doors and Frames" for steel frames to hold flush wood doors.
 - 2. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - 1. Dimensions and locations of blocking.
 - 2. Dimensions and locations of mortises and holes for hardware.
 - 3. Dimensions and locations of cutouts.
 - 4. Undercuts.
 - 5. Requirements for veneer matching.
 - 6. Doors to be factory finished and finish requirements.
 - 7. Fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 FIELD 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 remainder of construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Algoma Hardwoods, Inc.
 - 2. Eggers Industries.
 - 3. Lynden Door.
 - 4. Masonite Architectural
 - 5. Mohawk Flush Doors, Inc.
 - 6. Oshkosh Door Company.
 - 7. Vancouver Door Company.
 - 8. VT Industries Inc.

- B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
 - 1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
- B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- 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 or UL 10C.
 - 1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208.1, Grade LD-2 made with binder containing no urea-formaldehyde.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
 - 3. Provide doors with glued-wood-stave cores instead of particleboard cores for doors indicated to receive exit devices and other thru-bolted hardware.
- F. Acoustical Rating for Solid Core Doors: Where indicated in door schedule on Drawings, provide STC 45 doors.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Premium, with Grade A faces.
 - 2. Species: White Birch, factory finished to match architect's approved sample.
 - 3. Cut: Plain Sliced.
 - 4. Match between Veneer Leaves: Book match.
 - 5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 - 6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
8. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A.
9. Core: Particleboard.
10. Construction: Five plies. Stiles and rails are bonded to core; then entire unit is abrasive planed before veneering.
11. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 1. Wood Species: Same species as door faces.
 2. Profile: Recessed tapered beads.
 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

2.5 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 NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, 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: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 2. Finish faces, all four edges, edges of cutouts, and mortises.
 3. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
1. Grade: Premium.
 2. Finish: WDMA TR-6 catalyzed polyurethane or WDMA TR-4 conversion varnish.
 3. Staining: As selected by Architect from manufacturer's full range.
 4. Effect: Semi-filled, produced by applying an additional finish coat to partially fill the wood pores.
 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
1. Install fire-rated doors according to NFPA 80.
 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.

- b. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- 2. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

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. Access doors and frames for walls and ceilings.
 - 2. Sound rated access panels and frames for walls.
 - 3. Coordinate with plumbing and electrical drawings to ascertain where access doors and frames are required. Provide an access door at all locations where a pipe valve or other mechanical device in walls or hard ceilings requires access for maintenance purposes.
- B. Key Abbreviations include the following:
 - 1. FPAD Flush Panel Access Door
 - 2. SRAP Sound Rated Access Panel
- C. Related Requirements:
 - 1. Section 099123 "Interior Painting" for jobsite painting of access doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, sound ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other Work.
- C. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation. All locations and type to be reviewed by Architect prior to installation.

1.4 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Exposed Flanges (FPAD):
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Larsens Manufacturing Company.
 - c. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - d. Nystrom, Inc.
 - e. Williams Bros. Corporation of America (The).
 - 2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
 - 3. Locations: Non-rated walls and ceilings.
 - 4. Door Size: As required for location served.
 - 5. Metallic-Coated Steel Sheet for Door: Nominal 0.064-inch, 16 gage, factory primed.
 - 6. Frame Material: Same material, thickness, and finish as door.
 - 7. Hinges: Spring-loaded, concealed-pin type.
 - 8. Latch and Lock: Cam latch at locations un-accessible to the public. Cam latch, key operated where locations are accessible to the public.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

- A. Fire-Rated, Insulated, Flush Access Doors and Trimless Frames (FPAD): Fabricated from metallic- coated steel sheet, except provide stainless steel sheet at "wet" locations including restrooms.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Larsens Manufacturing Company.
 - c. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - d. Nystrom, Inc.
 - e. Williams Bros. Corporation of America (The).
 - 2. Locations: Rated walls and ceilings.
 - 3. Fire-Resistance Rating: Not less than that of adjacent construction.
 - 4. Temperature-Rise Rating: 250 deg F at the end of 30 minutes.

5. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036-inch.
6. Frame: Minimum 0.060-inch thick sheet metal with drywall bead.
7. Hinges: Spring-loaded, concealed-pin type.

B. Hardware:

1. Latch: Operated by knurled knob at mechanical and other secured locations with interior release.
2. Latch and Lock: Cam latch, key operated.

2.4 SOUND RATED ACCESS DOORS AND FRAMES

A. Sound-Rated, Flush Access Doors and Frames (SRAP): STC Series, interior, sound rated access panels and frames.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Larsens Manufacturing Company.
 - c. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - d. Nystrom, Inc.
 - e. Williams Bros. Corporation of America (The).
2. Locations: Sound Walls.
3. STC Rating: 47 STC minimum.
4. Frame: 16-gauge steel with 1-inch flange.
5. Insulated Door: 20-gauge steel mounted to frame with continuous heavy-duty hinge (provide not less than 110-degree opening); 2-1/4 inch thickness.
6. Finish: Powder coat paint – white.
7. Standard Latch: Nonlocking, flush, black, compression paddle latch.
8. Gasketing: Continuous, heavy duty EPDM rubber compression gasket, attached to frame.

2.5 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 zinc-iron alloy (galvannealed) coating or A60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.
- B. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 1. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

- a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- 2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- C. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.6 STAINLESS-STEEL MATERIALS

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
 - 1. Finish: Directional Satin Finish, No. 4.

2.7 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 mounting holes, 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 panels securely attached to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.
- E. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
 - 2. For cylinder locks, furnish two keys per lock and key all locks alike.
 - 3. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.8 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 and Metallic-Coated-Steel Finishes:
 - 1. Factory Primed: Apply manufacturer's standard, fast curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
 - 2. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil for topcoat.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.
- D. STC-Rated Assemblies: Comply with ASTM C919 and with manufacturer's written recommendations for closing off sound-flanking oaths around or through assemblies.
 - 1. Unless otherwise recommended, install panel frame in a continuous and full bed (depth of frame) of acoustical sealant.

3.2 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 083113

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. Contractor to furnish and install hollow metal and wood acoustical door assemblies as indicated.
- B. Key Abbreviations include the following:
 - 1. SCDA Sound Control Door Assembly

1.3 REFERENCE STANDARDS

- A. ANSI/WDMA I.S. 1-A – Wood Flush Doors.
- B. ASTM A 569 – Standard Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
- C. ASTM A 653/A 653M – Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
- D. ASTM B 117 – Standard Method of Salt Spray (Fog) Testing.
- E. ASTM D 1735 – Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus.
- F. ASTM E 90 – Standard Test Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions.
- G. ASTM E 336 – Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
- H. ASTM E 413 – Classification for Determination of Sound Transmission Class.
- I. HMMA 840 – Installation and Storage of Hollow Metal Doors and Frames; Hollow Metal Manufacturer's Association.

1.4 SYSTEM DESCRIPTION

- A. Design Requirements: Acoustical door assemblies to include doors, frames, and door hardware to include gasketing systems, retainers and retainer covers, automatic or fixed door bottoms, cam-lift hinges, thresholds, and sills required to achieve specified performance requirements.

- B. Performance Requirements: Sound Transmission Coefficient rating of STC 50 for installed assembly, when tested as operable door assembly in accordance with ASTM E 90 and ASTM E413

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Hollow Metal Door: Indicate door materials and construction.
 - 2. Wood Doors: Indicate door materials and construction; indicate veneer species type and characteristics.
- B. Shop Drawings: Indicate door opening criteria, elevations, sizes, types, swings; identify and detail cutouts.
- C. Samples for Initial Selection: Two (2) sample sets of available door finishes, representing manufacturer's full range.

1.6 INFORMATIONAL SUBMITTALS

- A. Quality Assurance Submittals:
 - 1. Test Reports:
 - a. Certified laboratory reports, performed in accordance with ASTM E 90 and ASTM E 413, from an independent testing laboratory qualified under the National Voluntary Laboratory Accreditation Program (NVLAP) supporting compliance of assemblies to specified requirements.
 - b. Minimum five (5) field tests, performed in accordance with ASTM E 336 and ASTM E413 by five separate independent testing agencies, substantiating acoustical performance when installed at no less than four (4) FSTC ratings below the specified STC rating.
 - 2. Certificates:
 - a. Contractor's certification that:
 - 1) Products of this section, as provided, meet or exceed specified requirements.
 - 2) Manufacturer of products of this section meet specified qualifications.
 - 3. Manufacturer's Instructions: Printed installation instructions for each component.

1.7 CLOSEOUT SUBMITTALS

- A. Warranty documents executed by manufacturer in Owner's name.
- B. Operation and Maintenance data for assembly components.

- C. Certified statement of manufacturer's authorized representative.
- D. Certified test reports of independent testing agency.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum five (5) years documented experience producing systems specified in this Section.
- B. Installer Qualifications: Minimum five (5) years documented experience installing systems specified in this Section and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store frames and doors in accordance with requirements of HMMA 840.
- B. Remove wraps or covers from doors and frames upon delivery at the building site. Clean and touch-up minor scratches or disfigurement of hollow metal finish caused by shipping or handling and promptly apply rust inhibitive primer.
- C. Store units on planks or dunnage in a dry location; store doors in a vertical position spaced by blocking.
- D. Store units covered to protect them from damage but permitting air circulation.

1.10 SCHEDULING

- A. Furnish manufacturer's mounting templates for door hardware specified in Section 087100 to manufacturer of products of this Section in time for factory preparation for door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Kreiger Specialty Products.
 - 2. Overly Manufacturing Products.
 - 3. Approved Equal.

2.2 DOOR SYSTEMS (SCDA)

- A. Provide acoustical assemblies complete with door, frame, anchors, sound seals, hinges, and cutouts and reinforcements for hardware items listed or required.

- B. Where indicated on the Drawings, provide factory-installed glazed vision light assembly in dimensions meeting STC rating.
- C. Acoustical Material: Manufacturer's standard for required STC rating.

2.3 COMPONENTS (SCDA)

- A. Steel Doors: 1-3/4-inch minimum thickness and as follows:
 - 1. Face Sheets: Galvanized steel sheet, minimum 16 gage sheet thickness. Visible seams on face not permitted.
 - 2. Core: Stiffen face sheets with continuous vertical steel sections. Fill spaces between stiffeners with acoustical material.
 - 3. Vertical Edges: Join face sheets at vertical edges by continuous welding
 - a. Join door faces by continuous welding on each edge, extending full door height.
 - b. Grind, fill and dress welds to provide smooth flush surface.
 - 4. Form edge profiles both vertical edges of doors with 1/8-inch in 2-inches bevel.
 - 5. Visible seams on vertical edges not permitted.
 - 6. Horizontal Edges:
 - a. Close top and bottom edges of doors with continuous steel channels, 16 gauge minimum; spot-weld channels to both door faces.
 - b. Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.
 - c. Provide additional flush closing channel at top edge of doors; spot-weld channel to both door faces.
 - 7. Hardware Preparation:
 - a. Mortise, reinforce, drill, and tap doors at factory for fully templated mortised hardware only, in accordance with approved hardware schedule and supplied templates.
 - b. Provide reinforcing plates at surface-mounted or non-templated hardware locations.
- B. Wood Doors: 2-inch thick, constructed of wood veneer of species indicated with a sound-deadening core.
 - 1. Construction:
 - a. All doors shall be of types and sizes shown on Drawings and shall have a 1-3/4-inch thick acoustical core. Doors shall be clad with 3-ply crossband veneer for 7-ply door construction. All adhesives, as well as warp tolerances, shall be in accordance with ANSI/NWWD I.S. 1-A.
 - b. Face veneers, stile and rail edges, and appearance features to match flush wood doors specified in Section 081416.
 - c. Factory finish sound control doors to match sample approved by Architect. Finish is required on all exposed surfaces of door including top and bottom edges.

2. Hardware Reinforcements: Doors shall be mortised and reinforced for fully templated hardware in accordance with the approved hardware schedule and templates provided by the hardware contractor.
- C. Vision Lites:
1. Factory-assemble lites in doors indicates to have lites, using glazing materials and assembly methods required for STC rating; field assembly not permitted.
 2. Fabricate dual-glazed lites permitting individual removal of each glazing pane.
- D. Loose Stops:
1. Fabricate of minimum 12-gauge steel, with factory-drilled and countersunk holes for fasteners.
 2. Form stops for mitered corner joints.
 3. Supply cadmium-coated or zinc-coated fasteners, size and quantity required for fastener holes.
- E. Door Hardware:
1. Supply gasketing systems, retainers, retainer covers, automatic door bottoms, fixed door bottoms, cam-lift hinges, thresholds, and sills to achieve specified performance requirements.
 2. All other door hardware is specified in Section 087100.
 3. Sill Condition: Furnish a smooth flush stainless steel or aluminum threshold for the door bottom to seal against when the door is in the closed position. The minimum width of the threshold shall be 4-inches to allow the threshold to extend a minimum of 1-inch beyond the face of the door on both sides of the opening. For openings where carpet extends through the opening, the threshold height shall be 1/8-inch greater in height than the carpet thickness.
- F. Frames:
1. Interior Frames: Fabricate from steel sheet, minimum 14-gage thickness, commercial quality, level, cold rolled steel conforming to ASTM 1008 and free of scale, pitting or other surface defects.
 2. Exterior Frames: Fabricate from galvanized (G90) coated steel sheet, minimum 14-gage thickness.
 3. Frames shall be fully welded. Knocked-down frames will not be accepted.
 4. Frames shall be mortised, reinforced, drilled and tapped frames for all templated hardware. Where surface mounted hardware and non-templated mortised hardware is to be applied, frames shall be reinforced.
 5. Wall anchors to be fabricated of same material as frame material; weld anchors inside each jamb for wall anchorage.
 - a. Frames for installation in stud partitions shall be provided with 16-gage steel zee anchors not more than 24-inches on-center.
 - b. Floor Anchors: Fabricate of same material as frame material; 16-gage. Weld anchors inside each jamb for floor anchorage.
 6. Provide welded frames with temporary steel spreader welded to jamb feet for bracing during shipping and handling.

7. Finish: All tool marks and surface imperfections shall be removed, and exposed faces of all welded joints shall be dressed smooth. Assemblies shall be treated and shall be coated on all accessible surfaces with rust-inhibitive primer which meets ASTM B117 salt spray for 150 hours, and ASTM D1735 water fog test for organic coatings for 200 hours, and which is fully cured prior to shipment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units in accordance with shop drawings and manufacturer's printed installation instructions.
- B. Fill voids between concealed side of frame and adjacent wall construction with foamed-in-place insulation and air-barrier foam as detailed.
- C. Finish surfaces having abrasion damage smooth.
- D. Install gasketing systems, retainers, retainer covers, automatic door bottoms, fixed door bottoms, cam-lift hinges, thresholds, and sills in accordance with manufacturer's printed instructions.
 1. Installation of all other door hardware is specified in Section 087100.
- E. Field painting of hollow metal is specified in Sections 099113 and 099123.
- F. Site Tolerances: Do not exceed the following frame installation tolerances:
 1. Squareness: Plus or minus 1/16 inch measured on a line, 90-degrees from one jamb, at the upper corner of the frame at the other jamb.
 2. Alignment: Plus or minus 1/16 inch measured on jambs on a horizontal line parallel to the plane of the wall.
 3. Twist: Plus or minus 1/16 inch measured at face corners of jambs on parallel lines perpendicular to the plane of the wall.
 4. Plumb: Plus or minus 1/16 inch measured on the jamb at the floor.

3.2 FIELD QUALITY CONTROL

- A. Inspect completed installation of door and frame assemblies.
- B. Test all components through a minimum of ten complete cycles of operation.
- C. Verify each component is correctly installed.
- D. Direct installer in adjusting components for correct operation.
- E. Issue certified statement of compliance of installed door and frame assemblies.

- F. Instruct Owner in correct operation and maintenance procedures for components of door and frame assemblies.
- G. Doors need to be installed plumb. Properly installed acoustical doors are airtight. If gaps occur in the installation, something is wrong and should be adjusted or changed.
- H. Acoustical compression seals need to be uniformly compressed around the entire perimeter of the door. Doors with properly adjusted compression seals will not latch easily. After installing the seals on the door, check the compression of the seal along each side by attempting to slip a small business card or 3x5 card stock into the space between the seal and the frame. It should not enter easily. Move the card up along the seal to ensure that the seal is properly adjusted along its entire length.
- I. If the door bottom seal is oriented toward one face of the door, or if it is surface mounted, it must be installed on the stop side of the jamb to align with the side and top seals.
- J. Adhesive bulb seals do not have adjustment capabilities. The door must be installed so that the gap between the door and the frame stop is uniform and not more than 3/16".
- K. Caulk must be applied continuously between all seals (other than adhesive bulb seals) and the door frame.
- L. Magnetic seals that are part of a prefabricated acoustical door system tend to fall out of the bottom of their extruded frame, in time. The extruded frame needs to be crimped at the bottom to prevent movement of the seal.
- M. Corner connections of seals, where side seals meet with top or bottom seals need to be carefully fitted and installed to prevent gaps.

END OF SECTION 083473

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. Exterior aluminum framed storefronts.
- 2. Aluminum storefront panels and trim.

- B. Key Abbreviations include the following:

- 1. A Aluminum Storefront (at Schedule)
- 2. ASF Aluminum Storefront
- 3. ASFT Aluminum Storefront Trim
- 4. SF Storefront (at Window Tags)

- C. Related Requirements:

- 1. Section 076200 "Sheet Metal Flashing & Trim" for flashing not part of the storefront system.
- 2. Section 079200 "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
- 3. Section 084413 "Glazed Aluminum Curtain Walls".
- 4. Sections 087100 "Finish Hardware" for hardware not included in this Section.
- 5. Section 088000 "Glazing" for insulating-glass requirements.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site prior to commencement of field installation to establish procedures to maintain working conditions and to coordinate this work with related and adjacent work. Verify that work of this section complies with manufacturer's current installation requirements and recommendations. Pre-con meeting should include representatives for the owner, architect, weatherization consultant, inspection firm, general contractor and aluminum storefront subcontractor.
 - 1. Review storefront requirements and installation, special details, connection to and continuity with adjacent thermal, weather, air and vapor barrier, and work scheduling that covers storefronts.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 2. Include isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Initial Selection: For units with factory-applied color finishes.

1.5 INFORMATIONAL SUBMITTALS

- A. Delegated-Design Submittal: For aluminum-framed entrances and storefronts 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. Include design calculations.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.
- C. Energy Performance Certificates: NFRC-certified energy performance value from manufacturer.
- D. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating storefront systems that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer
- 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 aesthetic effects and performance characteristics of assemblies. 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.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes 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/ANSI A117.1.
- G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabrication without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.9 WARRANTY

- A. Total Storefront Installation
 - 1. Installer shall assume full responsibility and warrant for two years the satisfactory performance of the total storefront installation. This includes the glass (including insulated units), glazing, insulated panels, anchorage and setting system, sealing, flashing, etc., as it relates to air, water and structural adequacy as called for in the specifications.

2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the installer at their expense during the warranty period.

B. Manufacturer Product and Finish Warranty

1. Manufacture shall provide a ten-year warranty against defects in material of aluminum-framed entrances and storefronts, including glass. Manufacturer agrees to repair or replace components that fail within the specified warranty period.
 - a. Glass: Insulated glass units shall 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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. 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, 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. Noise or vibration created by wind and by thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units.
- C. Structural Loads:
 1. Wind Loads: As indicated on Drawings.
 2. Seismic Loads: As indicated on Drawings.
- D. Deflection of Framing Members:
 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.

2. Deflection Parallel to Glazing Plane: Limited to $L/360$ of clear span or $1/8$ inch, whichever is smaller.
3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
 - a. Perpendicular to Plane of Wall: No greater than $1/240$ of clear span plus $1/4$ -inch for spans greater than 11 feet 8-1/4 inches or $1/175$ times span, for spans less than 11 feet 8-1/4 inches.

E. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft.

G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

H. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Average Thermal Conductance: Provide glazed aluminum storefront systems with a maximum average U-factor of .37 at fixed vision units. U-factor shall be based on the performance of the individual curtain wall components, with $U = \text{Btu/sq. ft.} \times h \times \text{deg F}$ when tested according to NFRC and Washington State Energy Code.
2. Condensation Resistance: Fixed glazing and framing areas shall have a condensation resistance rating of no less than 67 for frame and 56 for glass as determined according to AAMA 1503.

I. 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.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 MANUFACTURERS (ASF) (SF)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer North America; an Alcoa company; Trifab VG 451T FG or a comparable product by one of the following:

1. EFCO Corporation
2. Oldcastle Building Envelope

3. United States Aluminum

- B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, and glazed aluminum curtain walls (Section 084413), including framing venting windows and accessories, from single manufacturer.

2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 4. Structural Profiles: ASTM B 308.
 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
1. Structural Shapes, Plates, and Bars: ASTM A 36.
 2. Cold-Rolled Sheet and Strip: ASTM A 1008.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011.

2.4 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Thermally broken.
 2. Glazing System: Retained mechanically with gaskets on four sides.
 3. Glazing Plane: Front Glazed.
 4. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- 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.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from stainless steel.

- E. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.
- F. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- G. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

2.5 DOORS

- A. Entrance Doors (A): Manufacturer's standard glazed doors for manual and electric swing operation.
 - 1. Basis of Design: Kawneer; Insulpour 500T.
 - 2. Door Construction: 2 ¼ -inch overall thickness, thermally broken, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated, and fillet welded or that incorporate concealed tie rods.
 - 3. Thermal Construction: The thermal barrier shall be dual pour and debridge or thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions that, when fully installed, meets or exceeds a .60 u value.
 - 4. Door Design: As indicated, minimum stile; 5-inch nominal width.
 - 5. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide non-removable glazing stops on outside of door.

2.6 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: refer to Section 087100 "Finish Hardware" for hardware not specified in this Section.
- B. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section.
 - 1. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
 - 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- C. Pivot Hinges: BHMA A156.4, Grade 1.
- D. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

- E. Operating Trim: BHMA A156.6.
- F. Weather Stripping: Manufacturer's standard replaceable components.
 - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 - 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- G. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

2.7 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Weatherseal Sealant: ASTM C 920 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.

2.8 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

- D. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 079200 "Joint Sealants."
- E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.
- F. Aluminum Storefront Trim (ASFT): Form exposed flashing and trim from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- G. Shims: Plastic horseshoe shims.

2.9 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- 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. 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.
- F. 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.
- G. 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.

- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- D. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018mm or thicker.
 - 1. Color: Dark Bronze Anodized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, 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.

3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 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.
 - 4. Rigidly secure non-movement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified in Section 088000 "Glazing."

F. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

G. 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.

3.4 FIELD QUALITY CONTROL

A. Field Tests: Weatherization Consultant shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the original contract amount.

1. Testing: Testing shall be performed by a qualified independent testing agency. Testing standard per AAMA 503, including reference to ASTM E783 for Air Infiltration Test and ASTM E1105 Water Infiltration Test.
 - a. Air Infiltration Tests: Conduct tests in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.
 - b. Water Infiltration Tests: Conduct tests in accordance with ASTM E1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.2 psf (300 Pa).

3.5 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; 1/4 inch over total length.
2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.6 ADJUSTING

- A. Adjust operating door hardware to function smoothly as recommended by manufacturer.

END OF SECTION 084113

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 the following:
 - 1. Exterior glazed aluminum framed curtain wall.
 - 2. Contiguous matching formed aluminum sills and trims.
 - 3. Flashings, counter flashings related to curtain wall work.
 - 4. Anchors, brackets, clips, and steel framing as required to secure curtain wall to structural framing.
 - 5. Perimeter joint sealing of aluminum to adjacent envelope systems; sealant work in connection with work of this Section.
 - 6. Perimeter air seal and internal sealants required to produce a finished, weathertight system.
 - 7. Field quality control testing of finished installation.
 - 8. Proof of compliance with design and performance requirements, including copies of lab and field quality control test reports, calculations, or other appropriate documentation.
- B. Key Abbreviations include the following:
 - 1. ACW Aluminum Curtain Walls
 - 2. ACWT Aluminum Curtain Wall Trim
 - 3. CW Aluminum Curtain Wall (at Window Tags)
- C. Related Requirements:
 - 1. Section 076200 "Sheet Metal Flashing & Trim" for flashing not part of the curtain wall system.
 - 2. Section 079200 "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain wall systems and for sealants to the extent not specified in this Section.
 - 3. Section 084113 "Aluminum Framed Entrances and Storefronts" for storefront framing and doors.
 - 4. Section 088000 "Glazing" for glass requirements.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site prior to commencement of field installation to establish procedures to maintain working conditions and to coordinate this work with related and adjacent work. Verify that work of this section complies with manufacturer's current installation requirements and recommendations. Pre-con meeting should include

representatives for the owner, architect, weatherization consultant, inspection firm, general contractor and aluminum curtain wall subcontractor.

1. Review curtain wall requirements and installation, special details, connection to and continuity with adjacent thermal, weather, air and vapor barrier, and work scheduling that covers curtain walls.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Data to support manufacturer's standard tests for air infiltration, water penetration, structural performance and thermal transmittance on curtain wall system.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.

1. Prepared by curtain wall system manufacturer.
2. Submit drawings and calculations to the City of Kenmore as required by the Building Official, and to the Architect.
3. Include structural analysis data signed and sealed by a structural engineer licensed in the State of Washington.
4. Show scale elevations and sections in as large a scale as practical.
 - a. Provide references to detail numbers on the architectural drawings.
5. Include a key to metal and glass thickness, types and metal finishes.
6. Show details of field connections and anchorages and their relationship to the work of other trades. Indicate type, grade and shape of steel; type and size of anchors.
7. Show details of sealing methods, sealing dimensions, sealing materials, gaskets, and product joinery. Identify type of sealant by manufacturer and product name.
8. Show glazing details and glazing methods, and details for expansion and contraction.
9. Show type of construction including joinery, fasteners and welds, anchorage assemblies and components, fabrication tolerances for the work of this Section and the adjoining related work, and layout of inserts and reglets.
10. Show drainage paths, weeps and baffles.
11. Indicate details of adjoining work to ensure coordination of this work and work of other Sections.
12. Do not proceed with fabrication until shop drawings have been reviewed by the Architect.
13. Show connection to and continuity with adjacent thermal, weather, air and vapor barriers.

C. Schedules: In order to coordinate the glass and sealant certification, provide the following:

1. Detailed schedule for sealants and related items such as primers and back-up material; designation of areas and locations for all types of sealants, primer and back-up materials used in each case; methods of application, special instructions, specification data sheets for shop drawings. Cross reference to schedule and supplement with explanatory details required to ensure and appraise the complete application of sealants.

2. Schedule of tapes, gaskets, separators, and related items including the designation of areas and specific locations; materials used; special instructions; specification data sheets, and related information. Cross reference scheduled items with shop drawings.

D. Samples: For each exposed finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Structural Calculations: Submit structural calculations made by or for curtain wall subcontractor in connection with supplementary design and detailing of the curtain wall work. Place particular attention on connections and attachments. Base calculations on worst case conditions for all allowable variations, tolerances and connections. Perform calculations under direct supervision of a licensed Professional Structural engineer registered in the state of Washington. Seal calculations.
- C. Qualification Data: For Installer.
- D. Energy Performance Certificates: NFRC-certified energy performance value from manufacturer.
- 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. Warranty Samples: Concurrent with initial product data submittal, submit sample of manufacturer's warranty for review of terms. Sample shall include all specified exceptions and inclusions.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.
 1. Detailed as-built drawings showing elements covered by shop drawings.
 2. Detailed procedures for periodic inspection, maintenance, and cleaning of applicable elements.
 3. Include detailed instructions for glass replacement procedures.

1.7 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer: A manufacturer capable of fabricating curtain walls that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
 2. Installer: An entity that employs installers and supervisors who are trained and approved by manufacturer.

3. Welding: Perform welding by skilled and qualified mechanics licensed where required in accordance with local governing regulations.
 - a. Perform welding in conformance with AWS Structural Welding Code D1.1 for steel and D1.2 for aluminum.
 4. Testing Laboratory: Qualified to conduct laboratory tests required by these specifications, and AAMA certified.
 5. Professional Engineer: Structural engineer who is legally qualified to practice in the jurisdiction where the project is located and who is experienced with similar glazed wall systems in providing engineering services of the kind indicated.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated, and AAMA certified.
- C. Source Limitations for Glazed Aluminum Curtain Wall Systems: Obtain from single source from single manufacturer.
- 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 aesthetic effects and performance characteristics of assemblies. 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 change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- F. Visual Mockups: The mockups will be used to demonstrate aesthetic effects and set quality standards for fabrication and installation, to the extent indicated below.
1. Construct mock-up of one mullion intersection with 12 x 12 glass unit. Mock-up requirement may be waived if capabilities of proposed system can be demonstrated via previous installations.
 2. Construct mock-up to include materials required to evaluate the aesthetic properties of the curtain wall, including but not limited to the following:
 - a. Glass and glazing, reviewed for type, appearance and color.
 - b. Sealants.
 - c. Framing components and finishes; snap-on caps only will be reviewed for finish and color.
- G. Laboratory Test Reports:
1. All windows and doors should be pre-tested by the manufacturer to design conditions.
 2. The associated tests shall be submitted as required under "Informational Submittals" above.

H. Field Testing:

1. For all windows, and doors, a mock setup will be water intrusion tested in field in accordance with the requirements set forth in Section 014523. Mock setup may be created in situ or be free standing as determined by the Architect. All mockups must pass Water Resistance Field Test Pressures. Copies of testing reports to be distributed to Owner, Architect and Weatherization Consultant.
2. All sealant dependent installations require adhesion test performed on site by contractor. Adhesion test logs shall be submitted to the Architect for review.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabrication without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.9 WARRANTY

A. Total Curtain Wall Installation

1. Installer shall assume full responsibility and warrant for two years the satisfactory performance of the total curtain wall installation. This includes the glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water and structural adequacy as called for in the specifications.
2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the installer at their expense during the warranty period.

B. Manufacturer Product and Finish Warranty

1. Manufacturer shall provide a ten-year warranty against defects in material of glazed aluminum curtain wall components, including glass. Manufacturer agrees to repair or replace components that fail within the specified warranty period.
 - a. Glass: Insulated glass units shall be free from obstruction of vision as a result of dust or film formation on the internal glass surface caused by failure of the hermetic seal due to defects in material and workmanship.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, registered in the state of Washington, to design glazed aluminum curtain walls.

- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also 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. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
- C. Structural Design Loads:
1. Wind Loads: Refer to structural drawings, "Structural Notes".
 2. Seismic Loads: Refer to structural drawings, "Structural Notes".
- D. Structural Test Performance: Provide glazed aluminum curtain-wall systems tested according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not less than 10 seconds
- E. Deflection of Framing Members: At design wind pressure, refer to structural drawings and the following:
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches when subjected to specified design loads.
 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch when carrying full loads.
 3. Cantilever Deflection: Where framing members overhang an anchor point, limited to 2 times the length of cantilevered member, divided by 175.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.

- G. Water Penetration, General: Provide curtain wall system incorporating rainscreen design principles with exterior water shedding surface and secondary continuous water barrier. All spaces and cavities within framing components between the two lines of defense against water penetration are to be drained to the exterior. Plane of secondary barrier to also form the plane of the air barrier. Maintain rainscreen design at interfaces with adjacent envelope systems.
- H. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
 - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
 - a. Water penetration is defined in the ASTM test standard.
- I. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
 - 1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 12 lbf/sq. ft.
 - 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- J. Interstory Drift: Provide glazed aluminum curtain wall systems that accommodate design displacement of adjacent floor levels. Refer to structural drawings "Structural Notes".
 - 1. Test Performance: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement.
- K. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- L. Energy Performance: Certify and label energy performance according to AAMA as follows:
 - 1. Thermal Transmittance (U-factor) Total System Assembly: Fixed glazing and framing areas shall have total U-factor of not more than 0.33.
 - 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.27.
 - 3. Average Thermal Conductance: Provide glazed aluminum curtain wall systems with a maximum average U-factor of 0.24 at fixed vision units. U-factor shall be based on the performance of the individual curtain wall components, with $U = \text{Btu/sq. ft.} \times h \times \text{deg F}$ when tested according to AAMA and Washington State Energy Code.
 - 4. Condensation Resistance: Fixed glazing and framing areas shall have an AAMA-certified condensation resistance rating of no less than 40 as determined according to AAMA 1503.
- M. 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.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
2. Test Performance: No buckling, stress on glass, glazing-edge seal failure, sealant failure, excess stress on curtain-wall framing, anchors and fasteners, or reduction of performance when tested according to AAMA 501.5.
 - a. Test High Exterior Ambient Air Temperature: 160 deg F.
 - b. Test Low Exterior Ambient Air Temperature: 0 deg F.
 - c. Test Interior Ambient Air Temperature: 75 deg F.

- N. Thermal Performance: Curtain wall framing to incorporate continuous thermal break separating framing components exposed to interior and exterior environments.

2.2 MANUFACTURERS (ACW) (CW)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer North America; an Alcoa company; 1600UT-1 and 1600UT-2 Curtain Wall Systems (as shown on Drawings) or a comparable product by one of the following:
1. EFCO Corporation
 2. Oldcastle Building Envelope
 3. United States Aluminum
- B. Source Limitations: Obtain all components of curtain wall system and aluminum-framed entrances and storefronts (Section 0884113), including framing spandrel panels entrances and accessories, from single manufacturer.

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Thermally broken.
 2. Glazing System: Retained mechanically with gaskets on four sides and structural silicone glazed per Drawings.
 3. Glazing Plane: Front.
 4. Fabrication Method: Either factory- or field-fabricated system.
- B. Pressure Cap: Manufacturer's standard aluminum components that mechanically retain glazing.
1. Standard snap-on aluminum trim that conceals fasteners except at locations indicated on Drawings to receive 3-inch deep caps.
- C. Pressure Plate: Material shall be aluminum with a flexural strength of no less than 82 ksi along the lineal's major axis.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209.
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

F. Shims:

1. Plastic horseshoe shims.

2.4 ENTRANCES

- A. Entrances: Comply with Section 084113 "Aluminum-Framed Entrances and Storefronts."

2.5 FASTENERS

- A. Schedule and designate fasteners on shop drawings, including washers and accessory hardware so that Architect can witness and review the assembled units for aesthetics.

2.6 JOINERY IN METAL WORK

- A. Carefully match exposed work to produce continuity of line, design, and finish. Accurately fit joints in exposed work, rigidly secured with hairline contact and sealed watertight unless otherwise shown or required for thermal movement.
- B. Where two or more sections of metal are used in building up members, bring the contact surfaces to smooth, true, and aligned surfaces. Secure together so that the joints are tight without the use of any pointing materials. Do not use exposed fasteners.
- C. Thoroughly clean and seal metal-to-metal joints by buttering joints with sealant immediately prior to the final assembly of abutting sections. Clean excess sealant from exposed surfaces.

2.7 GLAZING

- A. Glazing & Sealants: Comply with Section 088000 "Glazing."

- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.
- D. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced GANA glazing publications.
- E. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- F. Before the shop/factory glazing of the curtain wall units and openings, check to see that they are square, plumb and in true plane.
 - 1. Do not proceed until proper corrections are made.
- G. Ensure that weep holes and drainage channels are unobstructed and free of dirt, rubbish, sealants and foreign materials.
- H. Inspect all lights of glass before installation. Do not install defective glass.
- I. Before setting glass, inspect frame for proper dimensions and squareness. Adjust frame and glass size to meet specified requirements.
- J. Thoroughly clean glazing pocket before setting glass. Use only solvents compatible with finished aluminum, glass and glazing materials.
- K. Place setting blocks at quarter points or as recommended by glass manufacturer. Side blocks, setting blocks and chairs shall be installed per recommendations of glazing manufacturer and shall be positively retained in position.
- L. Remove and replace stops and apply exterior weather sealants as required for complete installation. Details of installation shall permit replacement of glass after the construction period.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glazing unit manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

- B. Expanded Cellular Glazing Tape: Closed-cell PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
 - 1. Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. Type 2, for glazing applications in which tape is used in combination with a full bed of liquid sealant.
- C. Glazing Accessories:
 - 1. Cleaners and Primers: Types recommended by gasket or sealant manufacturer.
 - 2. Setting Blocks: Type II heat cured, preformed silicone rubber, Shore "A" durometer hardness 80, 4 inches long x ¼ inches high x width to suit glass thickness.
 - 3. Spacers: Heat cured, preformed silicone rubber, Shore "A" hardness 50 – 70, Type I or II, continuous rod or wedge.
 - 4. Edge Blocks: Heat cured, preformed silicone rubber, hardness required to limit lateral movement (side-walking) of glass.

2.9 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 079200 "Joint Sealants."
- E. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.
- F. Aluminum Curtain Wall Trim (ACWT): Form exposed flashing and trim from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

2.10 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. 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. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior.
 - 6. Provisions for safety railings mounted on interior face of mullions.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - 8. Components curved to indicated radii.
- D. Fabricate components to resist water penetration as follows:
 - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 - 2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
- E. Curtain-Wall Framing: Fabricate components for assembly using shear-block system.
- F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.11 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- D. Color Anodic Finish: AAMA 611 AA-M12C22A42/A44, Class I 0.018 mm or thicker.

1. Color: Dark Bronze Anodized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, 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.

3.2 PREPARATION

- A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 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.
 4. Rigidly secure non-movement joints.
 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 7. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum is in 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 glazed aluminum curtain wall to exterior.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Section 088000 "Glazing."

1. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

F. Sealants:

1. Inspect and verify conditions of openings and joints requiring sealants prior to application. Report conditions detrimental to achieving a positive, weathertight seal to the Architect prior to commencing work.
2. Commencement of application is construed as acceptance of surfaces and joints as adequate to receive work.
3. Preparation:
 - a. Thoroughly clean all joints to be sealed. Ensure joints are dry, free from dust, grease, loose mortar, paint or other foreign material, which may act as a bond breaker.
 - b. Clean metal surfaces which the sealant will contact with cleaner recommended by sealant manufacturer to suit application.
 - c. Prime all surfaces to receive sealant where improved adhesion will occur. Prime concrete surfaces.
 - d. Use backer rod or approved bond breaker in all joints.
4. Application:
 - a. Gun apply sealant through a nozzle opening of such a diameter that the full bead of sealant is gunned into the joint, filling it completely.
 - b. Immediately tool all beads after application to ensure full contact with the inner faces of the joint.
 - c. Do not soap tools or blades.
 - d. Tool joints concave and recessed from the face.
 - e. Install materials in strict accordance with manufacturer's written instructions.

G. Flashing:

1. Install flashing in the materials and profiles indicated.
2. Use flashings in longest practical length.
3. Provide moveable joints for expansion where required.
4. Where movable joints are necessary, lap 12-inches minimum and seal completely over entire lapped area or abut adjacent sections and install sealed splice.
5. Use mechanical fasteners to maintain contact of overlapping elements where expansion provision is not required.

- H. Perimeter Air Seal: Install continuous aluminum angle and sealant at typical locations indicated on the drawings.

3.4 FIELD QUALITY CONTROL

- A. Owner's Field Tests for Water Leakage with Static Air Pressure Difference: ASTM E 1105 at a uniform static air pressure difference of 12.0 psf; no water penetration.

- B. Field performance tests for water penetration to be conducted by an AAMA Accredited laboratory or other qualified testing agency.
- C. Provide minimum 2 weeks' notice to Architect of scheduled test date and time.
- D. As installation progresses, conduct field tests on one (1) designated completed glazed aluminum curtain wall assembly as soon as is practical after installation has started. Test early during installation so that errors in fabrication or installation can be found and corrections made before remainder of glazed aluminum curtain wall assemblies are installed.
 - 1. Test area to include interface with adjacent wall systems, as well as typical sill, vertical, and horizontal mullions, as well as typical stacked joint.
- E. If any installation fails performance tests, correct observed deficiencies and re-test at Curtain Wall Contractors own expense. Incorporate corrective measures into all final glazed aluminum curtain wall assembly installations.

3.5 ERECTION TOLERANCES

- A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2-inch-wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1-inch-wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1-inch-wide or more, limit offset from true alignment to 1/4 inch.
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

END OF SECTION 084413

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 aluminum windows for an interior location at the Control Booth.
- B. Key Abbreviations include the following:
 - 1. AW Aluminum Window
- C. Related Requirements:
 - 1. Section 079200 "Joint Sealants" for installation of joint sealants installed with aluminum window systems and for sealants to the extent not specified in this Section.
 - 2. Section 088000 "Glazing" for insulating-glass requirements.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other Work, operational clearances, and the following:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Weather-stripping details.
 - 4. Glazing details.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- B. Field quality-control reports.
- C. Sample Warranties: For manufacturer's warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum windows to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aluminum windows' 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.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal wear.
 - e. Failure of insulating glass.
 - 2. Warranty Period:

- a. Window: 10 years from date of Substantial Completion of the Project.
 - b. Glazing Units: Five years from date of Substantial Completion of the Project.
 - c. Aluminum Finish: 10 years from date of Substantial Completion of the Project.
- B. Manufacturer's Special 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

2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 1. Window Certification: AMMA certified.

2.2 ALUMINUM WINDOWS (AW)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Arcadia Northwest
 2. EFCO Corporation
 3. Kawneer NA
- B. Basis of Design product:
 1. Kawneer; OptiQ AA5450 Series, aluminum horizontal sliding and fixed window meeting the requirements of this section.
- C. Operating Types: Provide the following operating types in locations indicated on Drawings:
 1. Horizontal Sliding.
 2. Fixed.
- D. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

- E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907 or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
- F. Window Hardware: Provide the following operating hardware:
 - 1. Handle: Continuous, integral pulls.
 - 2. Sash Locks.
 - 3. Composite adjustable tandem roller.
 - 4. Stainless steel roller track.
 - 5. Standard auto lock.
- G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
 - 1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/NWWDA 101/I.S.2.
- H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.
- I. Insulating-Glass Units: Refer to Section 088000 "Glazing".

2.3 ACCESSORIES

- A. Aluminum Window Trim: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing and trim from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- B. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated. Cadmium-plated steel anchors, clips, and accessories are not permitted.
- C. Compensating Head Track: Provide matching separate compensating head track to allow structural movement without affecting window performance.
- D. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.4 FABRICATION

- A. Fabricate aluminum windows, in sizes indicated, that comply with performance class and performance grade indicated. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- D. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" 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.

2.6 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Aluminum Windows:
 - 1. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall and other adjacent construction.
- C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 ADJUSTING

- A. Adjust operable windows, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.4 PROTECTION AND CLEANING

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.
- B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with 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.

END OF SECTION 085113

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Work under this section includes the complete finish hardware requirements for the project. Quantities listed are for the contractor's convenience only and are not guaranteed. Items not specifically mentioned, but necessary to complete the work shall be furnished, matching the items specified in quality and finish.
- B. Key Abbreviations include the following:
 - 1. HW Hardware
 - 2. TH Threshold
- C. Related Sections:
 - 1. Section 08 Hollow Metal Doors and Frames
 - 2. Section 08 Wood Doors
 - 3. Section 08 Aluminum Entrances and Storefronts
 - 4. Section 28 Electronic Security and Safety

1.2 QUALITY ASSURANCE

- A. Product Qualification:
 - 1. To assure a uniform high quality of materials for the project, it is intended that only specified items be furnished. Comparable products may be accepted upon prior approval of architect.
 - 2. Hardware to be new, free of defects, blemishes and excessive play. Obtain each kind of hardware (Mechanical latch and locksets, exit devices, hinges and closers) from one manufacturer except where specified.
 - 3. Fire-Rated opening in compliance with NFPA80. Hardware UL10C/UBC-7-2 (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved bearing hinges and smoke seal. Furnish openings complete.
- B. Supplier Qualifications:
 - 1. Hardware supplier will be a direct factory contract supplier who employs a certified Architectural Hardware Consultant (AHC) available at all reasonable times during the course of the work for project hardware consultation to owner, architect and contractor.
 - 2. Supplier will be responsible for detailing, scheduling and ordering of finish hardware.
 - 3. Conduct pre-installation conference at jobsite. Initiate and conduct with supplier, installer and related trades. Coordinate materials and techniques and sequence complex hardware items and systems installation.
 - 4. Key Conference shall be initiated and conducted with owner to determine system, keyway(s) and structure.

C. Installer Qualifications:

1. Installer to have not less than 3 years' experience specializing in installation of work in this section. Company must maintain qualified personnel trained and experienced in installing hardware.

1.3 REFERENCES

- A. IBC – International Building Code
- B. NFPA80 – Fire Doors and Windows
- C. NFPA101 – Life Safety Code
- D. NFPA105 – Smoke and Draft Control Door Assemblies
- E. ANSI A117.1 - Accessible and Usable Buildings and Facilities
- F. BHMA – Builders Hardware Manufacturers Association
- G. DHI – Door Hardware Institute

1.4 SUBMITTALS

- A. Hardware schedule: Submit digital copies of schedule. Organize vertically formatted schedule into Hardware Sets with index of doors and headings, indicate complete designations of every item required for each door or opening. Include the following:
 - 1. Type, style, function, size, quantity and finish of hardware items.
 - 2. Name, part number and manufacture of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Explanation of abbreviations, symbols and codes contained in schedule.
 - 5. Door and frame sizes, materials and degrees of swing.
- B. Product Data: Submit digital copies for each product indicated.
- C. Templates: Obtain and distribute templates for doors, frames, and other works specified to be prepared for installing door hardware.
- D. Wiring/Riser diagrams: As required for electric hardware indicated.
- E. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.
- F. Keying Schedule: Prepared by or under the supervision of supplier, after receipt of the approved finish hardware schedule, detailing Owner's final keying instructions for locks.
- G. Samples: Upon request submit material samples.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle and protect products to project site under provisions of Division 1 and as specified herein.
- B. Tag each item or package separately, with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver keys to Owner by registered mail.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
 - a. Closers: Thirty years
 - b. Automatic operators: Two years
 - c. Exit Devices: Three years mechanical, one year electrical
 - d. Locksets: Three years mechanical, one year electrical

1.7 MAINTENANCE

- A. Extra Materials:
 - 1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. 5 EA L9080 locksets
- B. Maintenance tools:
 - 1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.1 MATERIAL AND FABRICATION

- A. Provide all door hardware for complete work, in accordance with the drawings and as specified herein.
- B. Provide items and quantities not specifically mentioned to ensure a proper and complete operational installation.

2.2 MANUFACTURERS

- A. Approval of products from manufacturers indicated as "Acceptable Manufacturer" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

| ITEM | SCHEDULED MANUFACTURER | ACCEPTABLE MANUFACTURER |
|----------------------------|---------------------------|----------------------------|
| Hinges | Ives (IVE) | Hager, Bommer |
| Flush Bolts & Coordinators | Ives (IVE) | Burns, Rockwood |
| Locksets & Deadlocks | Schlage (SCH) | No Substitute |
| Exit Devices & Mullions | Von Duprin (VON) | No Substitute |
| Electric Strikes | Von Duprin (VON) | Trine, SDC |
| Power Supplies | Von Duprin (VON) | No Substitute |
| Cylinders & Keying | Schlage (SCH) | No Substitute |
| Door Closers | LCN (LCN) | No Substitute |
| Automatic Operators | LCN (LCN) | No Substitute |
| Door Trim | Ives (IVE) | Trimco, Burns |
| Protection Plates | Ives (IVE) | Trimco, Burns |
| Overhead Stops | Glynn-Johnson (GLY) | Rixson, Sargent |
| Thresholds & Weatherstrip | Zero (ZER) | NGP, Reese, Pemko |

2.3 HANGING

- A. Conventional Hinges: Hinge open width minimum, but of sufficient throw to permit maximum door swing. Steel or stainless steel pins:
1. Three hinges per leaf to 7 feet, 6-inch height. Add one for each additional 30 inches in height or any fraction thereof.
 2. Provide standard-weight 4 ½ x 4 ½ for 1 ¾" thick doors up to 3'5". Provide heavy-weight 5 x 4 ½ on doors 36" and over.
 3. Exterior outswing doors to have non removable (NRP) pins.
 4. Pin tips, flat button, finish to match leaves.
 5. Interior doors over 36" – Heavy weight.
 6. Interior doors up to 36" – Standard weight.

2.4 LOCKSETS, LATCHSETS, DEADBOLTS

- A. Heavy Duty Mortise Locks and Latches: Schlage L9000 Series
1. Provide mortise locks certified as ANSI A156.13, Grade 1 Operational, Grade 1 Security.
 2. Provide lock case that is multi-function and field reversible for handing without opening case, and manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
 3. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1 inch (25 mm) throw, constructed of stainless steel.
 4. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 5. Provide electrified options as scheduled in the hardware sets.

6. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Lever Design: Schlage 06L
- B. Auxiliary Locks: Schlage B600 Series
 1. Provide deadbolt series conforming to ANSI/BHMA A156 and function as specified.
 2. Provide deadbolts with standard 2-3/4 inches (70 mm) backset. Provide 2-3/8 inches (60 mm) where noted or if door or frame detail requires. Provide deadbolt with full 1 inch (25 mm) throw, constructed of steel alloy.
 3. Provide manufacturer's standard strike.

2.5 EXIT DEVICES

- A. Panic and Fire Rated Exit Devices: Von Duprin 98/99 Series
 1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, AND UL listed for Panic Exit or Fire Exit Hardware.
 2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
 3. Quiet Operation: Incorporate fluid damper or other device that eliminates noise of exit device operation.
 4. Touchpad: Extend minimum of one half of door width, but not the full length of exit device rail. Provide end-cap with two-point attachment to door. Provide compression springs in devices, latches, and outside trims or controls; tension springs prohibited.
 5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrical requirements.
 6. Provide exit devices with manufacturer's approved strikes.
 7. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
 8. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
 9. 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.
 10. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
 11. Where lever handles are specified as outside trim for exit devices, provide heavy-duty 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.
 - a. Lever Style: Match lever style of locksets.

2.6 ELECTRIC STRIKES

- A. Manufacturers and Products: Von Duprin 6000 Series
 1. Provide electric strikes designed for use with type of locks shown at each opening.
 2. Provide electric strikes UL Listed as burglary-resistant.

3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide fail-secure type electric strikes, unless specified otherwise.
5. Coordinate voltage and provide transformers and rectifiers for each strike as required.

2.7 KEYS, KEYING, AND KEY CONTROL

- A. See Keying Requirements in this section

2.8 CLOSERS

- A. Surface Closers: LCN 4010/4110 Series
 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
 2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
 3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17 mm) diameter double heat-treated pinion journal.
 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
 7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
 8. Pressure Relief Valve (PRV) Technology: Not permitted.
 9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
 10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.9 AUTOMATIC OPERATORS

- A. Electro-Mechanical Automatic Operator: LCN Senior Swing
 1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI A156.19.
 2. 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, mats, and sensors.
 3. Provide drop plates, brackets, or adapters for arms as required to suit details.
 4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
 5. 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. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

2.10 OTHER HARDWARE

A. Door stops: Provide stops to protect walls, casework or other hardware.

1. Except as otherwise indicated, provide stops (wall, floor or overhead) at each leaf of every swinging door leaf.
2. Where wall or floor stops are not appropriate, provide overhead holders.

B. Weatherstrip and Gasket

1. Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled.
2. Provide non-corrosive fasteners as recommended by the manufacturer for application indicated.

C. Thresholds

1. Except as otherwise indicated, provide standard metal threshold unit of type, size and profile as detailed or scheduled.

D. Silencers

1. Interior hollow metal frames, 3 for single doors, 2 for pairs of doors.

E. Kickplates

1. Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

2.11 HARDWARE FINISH

A. Provide the following finishes unless noted differently in hardware groups:

| | |
|---------------------|--|
| Hinges | 630 Stainless Steel Exterior, 652 Dull Chrome Interior |
| Locksets | 626 Dull Chrome |
| Exit Devices | 626 Dull Chrome |
| Closers | 689 Aluminum |
| Kickplates | 630 Stainless Steel |
| Other Hardware | 626 Dull Chrome |
| Thresholds | Aluminum |
| Weatherstrip/Sweeps | Aluminum |

2.12 KEYING REQUIREMENTS

- A. All keys and keyed cylinders shall be subject to the existing Northshore School District Grand Master Key system and further keyed as directed and coordinated by NSD. Cylinders and Keying shall include:

1. Everest 29 Primus Full Size Interchangeable Core (FSIC) restricted keying, Primus level 9G on all cylinders and keys, Restricted 6-pin solid brass.

ALLEGION STRUCTURE NO: KS17468 (Kay-Es, One-Seven-Four-Six-Eight).
 2. Visual Key Control: Cylinders shall furnished with visual key control with key code factory stamped on the side of the cylinders. All keys shall be furnished with visual key control and shall be factory stamped with key code symbol and a unique identifier for that code.
 3. All locking doors shall be individually keyed. Prior to ordering keys and cores, key code meetings shall be held with contractor, NSD and school representatives to determine instruction for keying.
- B. Construction and Permanent Cores: Furnish cylinders with construction cores. Following construction, supply and install permanent keyed cores. NSD will provide one (1) control key for the installation of the new cores.
- C. ORDERING Keys and Cylinders:
1. E-validation will be required to order keys and cylinders. NSD will provide authorization facesheets.
 2. Cylinders and Keys shall be sent directly from the factory to NSD locksmith via traceable carrier.
 3. Keying transcript for bittings are required and will be sent via CSV and PDF file to NSD via email to NSD locksmith, and the NSD security project manager. Email addresses and authorization to be provided by NSD.
 4. Key Quantities
 - 2 EA Construction Control Keys
 - 15 EA Construction KeysChange Keys per keyed alike group per results of key code meeting. Assume 50 Change Keys total.
50 extra key blanks

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ensure that walls and frames are square and plumb before hardware installation.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes. Notify Architect of any code conflicts before ordering materials.

3.2 INSTALLATION

- A. Do not install surface mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation.
- B. Locate floor stops not more than 4 inches from the wall.

- C. Drill pilot holes for fasteners in wood doors and/or frames.

3.3 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.4 DEMONSTRATION

- A. Demonstrate electrical, electronic and pneumatic hardware system including adjustment and maintenance procedures.

3.5 PROTECTION/CLEANING

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.6 DOOR HARDWARE GROUPS

HW SET: 01
DOOR(S): 143

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 02
DOOR(S): 101B –

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------------------|---|---------|------|
| 2 | EA | PIVOT SET | 7226 SET | 626 | IVE |
| 2 | EA | INTERMEDIATE PIVOT | 7226 INT | 626 | IVE |
| 2 | EA | POWER TRANSFER | EPT10 | ✓ 689 | VON |
| 1 | EA | KEYED REMOVABLE MULLION | KR4954-STAB-MT54 | 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | RX-QEL-98-DT 24 VDC | ✓ 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | RX-QEL-98-NL 24 VDC | ✓ 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 2 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 3 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 2 | EA | PIPE STOP | 1804 | 630 | ABH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 9542 DD MS | ✓ ANCLR | LCN |
| 1 | EA | RELAY/DOOR SEQUENCER | 8310-845 | ✓ 689 | LCN |
| 1 | EA | ACTUATOR, WALL MOUNT | 8310-856T | ✓ 630 | LCN |
| 1 | EA | MULLION SEAL | 8780NBK PSA | BK | ZER |
| 2 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |
| 1 | EA | KEY SWITCH | 653-14 L2 12/24 VDC | ✓ 630 | SCE |
| 1 | EA | POWER SUPPLY | PS902 900-4RL | ✓ LGR | SCE |
| | | | ACCESS CONTROL - WORK OF DIVISION 28 | ✓ | |
| 1 | EA | | WEATHERSTRIP BY DOOR/FRAME MANUFACTURER | | |
| 1 | EA | BOLLARD | BPS-6X6X54-SM-FT-32D-PREP FOR LCN 856T X CARD READER | 32D | WIKK |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 03
DOOR(S): 101A

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------------------|--------------------------|--------|-----|
| 2 | EA | PIVOT SET | 7226 SET | 626 | IVE |
| 2 | EA | INTERMEDIATE PIVOT | 7226 INT | 626 | IVE |
| 2 | EA | POWER TRANSFER | EPT10 | ✓ 689 | VON |
| 1 | EA | KEYED REMOVABLE MULLION | KR4954-STAB-MT54 | 689 | VON |
| 2 | EA | ELEC PANIC HARDWARE | RX-QEL-98-DT 24 VDC | ✓ 626 | VON |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 2 | EA | PIPE STOP | 1804 | 630 | ABH |
| 2 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | MULLION SEAL | 8780NBK PSA | BK | ZER |
| 2 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |
| 1 | EA | POWER SUPPLY | PS902 900-4RL | ✓ LGR | SCE |
| | | | ACCESS CONTROL - WORK OF | ✓ | |
| | | | DIVISION 28 | | |
| 1 | EA | | WEATHERSTRIP BY | | |
| | | | DOOR/FRAME MANUFACTURER | | |

HW SET: 04
DOOR(S): 102B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|---------------------------|-------------------------|---------|-----|
| 2 | EA | PIVOT SET | 7226 SET | 626 | IVE |
| 2 | EA | INTERMEDIATE PIVOT | 7226 INT | 626 | IVE |
| 2 | EA | DUMMY PUSH BAR | 350-DT-990 | 626 | VON |
| 1 | EA | FLOOR STOP& HOLD | FS446 | 626 | GLY |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 9542 DD MS | ✓ ANCLR | LCN |
| 1 | EA | RELAY/DOOR SEQUENCER | 8310-845 | ✓ 689 | LCN |
| 1 | EA | ACTUATOR, NARROW MOUNT | 8310-818T | ✓ 630 | LCN |
| 2 | EA | DOOR SWEEP | 8192AA | AA | ZER |
| 1 | EA | THRESHOLD | 545A | A | ZER |
| 1 | EA | | WEATHERSTRIP BY | | |
| | | | DOOR/FRAME MANUFACTURER | | |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 05
DOOR(S): 102A

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|--|----------------|--------|-----|
| 2 | EA | PIVOT SET | 7226 SET | 626 | IVE |
| 2 | EA | INTERMEDIATE PIVOT | 7226 INT | 626 | IVE |
| 2 | EA | DUMMY PUSH BAR | 350-DT-990 | 626 | VON |
| 2 | EA | FLOOR STOP& HOLD | FS446 | 626 | GLY |
| 2 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 2 | EA | DOOR SWEEP | 8192AA | AA | ZER |
| 1 | EA | THRESHOLD | 545A | A | ZER |
| 1 | EA | WEATHERSTRIP BY DOOR/FRAME MANUFACTURER | | | |

HW SET: 06
DOOR(S): 218B, 221B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | PANIC HARDWARE | LD-98-NL | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | PIPE STOP | 1804 LESS HOOK | 630 | ABH |
| 1 | EA | DRIP CAP | 16A | AL | NGP |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |

HW SET: 06W
DOOR(S): 104

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 630 | IVE |
| 1 | EA | PANIC HARDWARE | LD-98-NL | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | PIPE STOP | 1804 LESS HOOK | 630 | ABH |
| 1 | EA | DRIP CAP | 16A | AL | NGP |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET 06S
DOOR 117

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|-----------------------|--------|-----|
| 3 | EA | CAM LIFT HINGE | BY DOOR SUPPLIER | | |
| 1 | EA | PANIC HARDWARE | LD-9875-NL | 630 | VON |
| 1 | EA | MORTISE CYLINDER | 20-061-ICX | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | CLOSER | 4040XP -PA | 689 | LCN |
| 1 | EA | KICKPLATE | 8400 10" X 2"LDW B-CS | 630 | IVE |
| 1 | EA | PIPESTOP | 1804 LESS HOOK | 630 | ABH |
| 1 | EA | DRIP CAP | 16A | AL | ZER |
| 1 | EA | THRESHOLD | BY DOOR SUPPLIER | | |
| 1 | EA | SOUND SEAL | BY DOOR SUPPLIER | | |
| 1 | EA | DOOR BOTTOM | BY DOOR SUPPLIER | | |

HW SET: 07S
DOOR(S): 106A, 106B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | L9070T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 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 | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 1 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP- 4"X36" | A | ZER |

HW SET: 08
DOOR(S): 227, 230

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 08*
DOOR(S): 003, 203

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BBHW 4.5X4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | CLOSER | 411 EDA | 626 | LCN |
| 1 | EA | KICKPLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | OVERHEAD STOP | 100S | 630 | GLY |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

HW SET: 09
DOOR(S): 108, 111, 205, 208

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|--------------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | CLASSROOM DEADBOLT | B663T | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | PUSH PLATE | 8200 4" X 16" | 630 | IVE |
| 1 | EA | PULL PLATE | 8302 10" 4" X 16" G | 630 | IVE |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | CLOSER | 4011 | 689 | LCN |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HW SET: 10
DOOR(S): 109, 133, 134, 135, 206, 223, 224, 225

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|---------------|------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | CORRIDOR LOCK | L9456T 06N L583-363 L283-722 | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | CLOSER | 4011 | 689 | LCN |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 11

DOOR(S): 110, 131, 207, 217

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

HW SET: 11S

DOOR(S): 231, 232, 303

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | FLOOR STOP | FS441 | 626 | IVE |
| 1 | EA | CLOSER | 4011 | 689 | LCN |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 1 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP-4"X36" | A | ZER |

HW SET: 11W

DOOR(S): 138

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 12S

DOOR(S): 112, 113, 121, 209, 210

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|------------------------|--------|-----|
| 8 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | PANIC HARDWARE | CDSI-QM-LBR-9827-NL-OP | 626 | VON |
| 1 | EA | PANIC HARDWARE | CDSI-QM-LBR-9827-EO | 626 | VON |
| 2 | EA | PULL | 8190-12"-O | | |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 2 | EA | MORTISE THUMBTURN | 09-900 XB11-720 | 626 | SCH |
| 3 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 2 | EA | FLOOR STOP & HOLD | FS40 | 626 | IVE |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 2 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP-4" | A | ZER |
| 4 | EA | MOUNTING BRACKET | 870SPB | | ZER |
| 2 | EA | MEETING STILE | 328AA-S | A | ZER |

HW SET: 13S

DOOR(S): 114A, 114B, 211A, 211B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|------------------------|--------|-----|
| 8 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 2 | EA | PUSH PULL | 9103EZ-HD-12"-N/O | 626 | VON |
| 2 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 2 | EA | FLOOR STOP & HOLD | FS40 | 626 | IVE |
| 2 | EA | MEETING STILE | 328AA-S | AA | ZER |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 2 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP-4" | A | ZER |

HW SET: 14

NOT USED

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|-----|---------------------|------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | FBLK | IVE |
| 1 | SET | CONST LATCHING BOLT | FB61P | BLK | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | 626 | IVE |
| 1 | EA | CLASSROOM LOCK | L9070T 06L | 622 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 622 | SCH |
| 1 | EA | SURFACE CLOSER | 4011 | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | BLK | IVE |
| 2 | EA | WALL STOP/HOLDER | FS495 | 626 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 2 | EA | DOOR SWEEP | 8192BK | BK | ZER |
| 2 | EA | MEETING STILE | 8192BK | BK | ZER |
| 1 | EA | THRESHOLD | 545A | A | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 15
DOOR(S): 118B, 125C

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|---|---------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 630 | IVE |
| 2 | EA | POWER TRANSFER | EPT10 | ✓ 689 | VON |
| 1 | EA | KEYED REMOVABLE MULLION | KR4954-STAB-MT54 | 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | RX-QEL-98-DT 24 VDC | ✓ 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | RX-QEL-98-NL 24 VDC | ✓ 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 2 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 3 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 2 | EA | PIPE STOP | 1804 | 630 | ABH |
| 2 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | DRIP CAP | 16A | AL | NGP |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | MULLION SEAL | 8780NBK PSA | BK | ZER |
| 2 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |
| 1 | EA | KEY SWITCH | 653-14 L2 12/24 VDC | ✓ 630 | SCE |
| 1 | EA | POWER SUPPLY | PS902 900-2RS | ✓ LGR | SCE |
| | | ACCESS CONTROL - WORK OF DIVISION 28 | | | ✓ |

HW SET: 16
DOOR(S): 128, 216, 301A

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 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 | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HW SET: 16W
DOOR(S): 127

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 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 | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 17
DOOR(S): 229

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|---|----------------------|---------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 2 | EA | POWER TRANSFER | EPT10 | ✓ 689 | VON |
| 1 | EA | KEYED REMOVABLE MULLION | KR4954-STAB-MT54 | 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | RX-QEL-98-DT 24 VDC | ✓ 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | RX-QEL-98-NL 24 VDC | ✓ 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 2 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 3 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | PIPE STOP | 1804 | 630 | ABH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 9542 DD MS | ✓ ANCLR | LCN |
| 1 | EA | RELAY/DOOR SEQUENCER | 8310-845 | ✓ 689 | LCN |
| 1 | EA | ACTUATOR, WALL MOUNT | 8310-856T | ✓ 630 | LCN |
| 1 | EA | DRIP CAP | 16A | AL | NGP |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | MULLION SEAL | 8780NBK PSA | BK | ZER |
| 2 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |
| 1 | EA | KEY SWITCH | 653-14 L2 12/24 VDC | ✓ 630 | SCE |
| 1 | EA | POWER SUPPLY | PS902 900-4RL | ✓ LGR | SCE |
| | | ACCESS CONTROL - WORK OF DIVISION 28 | | ✓ | |

HW SET: 18
DOOR(S): 212

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------------|----------------------|---------|-----|
| 2 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 2 | EA | DUMMY PUSH BAR | 350-DT-990 | 626 | VON |
| 1 | EA | FLOOR STOP & HOLD | FS446 | 626 | IVE |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 9542 DD MS | ✓ ANCLR | LCN |
| 1 | EA | RELAY/DOOR SEQUENCER | 8310-845 | ✓ 689 | LCN |
| 1 | EA | ACTUATOR, WALL MOUNT | 8310-856T | ✓ 630 | LCN |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 2 | EA | DOOR SWEEP | 8192AA | AA | ZER |
| 1 | EA | THRESHOLD | 545A | A | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 19
DOOR(S): 118C

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|-----|---------------------|------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | SET | CONST LATCHING BOLT | FB61P | 630 | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | 626 | IVE |
| 1 | EA | CLASSROOM LOCK | L9070T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | OVERHEAD STOP | 100S | 630 | GLY |
| 2 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

HW SET: 20SW
DOOR(S): 120

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 652 | IVE |
| 1 | EA | PANIC HARDWARE | QM-9875-L-2 -06 | 626 | VON |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | RIM THUMBTURN | XB11-979 | 626 | SCH |
| 1 | EA | OH STOP | 100S | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 1 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 545A | A | ZER |
| 2 | EA | MOUNTING BRACKET | 870SPB | | ZER |

HW SET: 21
DOOR(S): 122, 140A, 123

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | OFFICE/ENTRY LOCK | L9050T 06N L583-363 L283-711 | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | CLOSER | 4011 | 689 | LCN |
| 1 | EA | KICKPLATE | 8400 10"X2"LDW B-CS | 630 | IVE |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET 21S
DOOR(S): 220A

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|------------------------------|--------|-----|
| 3 | EA | CAM LIFT HINGE | BY DOOR SUPPLIER | | |
| 1 | EA | OFFICE LOCK | L9050T 06N L583-363 L283-711 | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKET | BY DOOR SUPPLIER | | |
| 1 | EA | AUTO DOOR BOTTOM | BY DOOR SUPPLIER | | |
| 1 | EA | THRESHOLD | BY DOOR SUPPLIER | | |

HW SET 21S*
DOOR(S): 220B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5X4.5 NRP | 652 | IVE |
| 1 | EA | LOCK | L9050T 06N L583-363 L283-711 | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | FLOOR STOP | FS441 | 626 | IVE |
| 1 | EA | GASKET | 870AA-S | AA | ZER |
| 1 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP- 4" | A | ZER |

HW SET: 22
DOOR(S): 125B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|--------------------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | ⚡ 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | RX-QEL-98-NL 24 VDC | ⚡ 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 2 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | PIPE STOP | 1804 | 630 | ABH |
| 1 | EA | RAIN DRIP | 142A | AL | ZER |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |
| 1 | EA | KEY SWITCH | 653-14 L2 12/24 VDC | ⚡ 630 | SCE |
| 1 | EA | POWER SUPPLY | PS902 900-2RS | ⚡ LGR | SCE |
| | | ACCESS CONTROL - WORK OF | ⚡ | | |
| | | DIVISION 28 | | | |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 23
DOOR(S): 124

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 2 | EA | MANUAL FLUSH BOLT | FB458 | 626 | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | 626 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | OH STOP | 100S | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A | AL | ZER |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | SECURITY ASTRAGAL | 43SP | SP | ZER |
| 2 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |

HW SET: 24
DOOR(S):125A

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------------------|------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | KEYED REMOVABLE MULLION | KR4954-STAB-MT54 | 689 | VON |
| 1 | EA | PANIC HARDWARE | CDSI-98-DT | 626 | VON |
| 1 | EA | PANIC HARDWARE | CDSI-98-NL | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 3 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 4 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 2 | EA | FLOOR STOP | FS441 | 626 | GLY |
| 2 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HW SET: 25
DOOR(S): 126

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|--------------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | FIRE EXIT HARDWARE | 98-NL-F | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 26S

DOOR(S): 129, 130, 213, 214

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|----------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | L9070T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 1 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP- 4" | A | ZER |

HW SET: 26SW

DOOR(S): 132, 215

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|--------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | L9070T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 1 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP- 4" | A | ZER |

HW 26T DOOR 139

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|--------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 652 | IVE |
| 1 | EA | OFFICE LOCK | L9050T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKET | 870AA-S | AA | ZER |
| 1 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP-4" | A | ZER |

HW SET: 27

DOOR(S): 140B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | OFFICE/ENTRY LOCK | L9050T 06N L583-363 L283-711 | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | OH STOP | 100S | 630 | GLY |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 28
DOOR(S): 142, 219, 222

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|-----|---------------------|------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | SET | CONST LATCHING BOLT | FB61P | 630 | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | 626 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 2 | EA | OH STOP & HOLDER | 100H | 630 | GLY |
| 2 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

HW SET: 29
DOOR(S): 141B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------------|------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | KEYED REMOVABLE MULLION | KR4954-STAB-MT54 | 689 | VON |
| 1 | EA | PANIC HARDWARE | LD-98-EO | 626 | VON |
| 1 | EA | PANIC HARDWARE | LD-98-NL | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-057 ICX | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 2 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 2 | EA | OH STOP | 100S | 630 | GLY |
| 2 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A | AL | ZER |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | MULLION SEAL | 8780NBK PSA | BK | ZER |
| 2 | EA | DOOR SWEEP | 8198AA | AA | ZER |
| 1 | EA | THRESHOLD | 103A | A | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 30S

DOOR(S): 141A, 218A, 221A

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|--------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 652 | IVE |
| 1 | EA | FLUSHBOLT | FB458 | 626 | IVE |
| 1 | EA | DST PROOF STRIKE | DP2 | 626 | IVE |
| 1 | EA | ASTRAGAL | 44STST X 488SBK | 630 | ZER |
| 1 | EA | ASTRAGAL | 1840 | AA | ZER |
| 1 | EA | THRESHOLD | 601CP- 4" | AA | ZER |
| 1 | EA | PANIC HARDWARE | CDSI 9875 NL X7/8 STRIKE | 626 | VON |
| 1 | EA | INSIDE THUMBTURN | 09-900 XB11-720 | 626 | SCH |
| 1 | EA | MORTISE CYLINDER | 20-061 ICX | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 2 | EA | WALL STOP | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 1 | EA | Z BRACKET | 870SPB | | ZER |
| 2 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |

HW SET: 31

DOOR(S): 201A, 201B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | PANIC HARDWARE | LD- 98EO | 626 | VON |
| 1 | EA | OH STOP | 100S | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4111 EDA | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

HW SET: 32

DOOR(S): 301B

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | STOREROOM LOCK | L9066T 06L | 626 | SCH |
| 2 | EA | PRIMUS CORE | 20-740 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4111 SCUSH | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A | AL | ZER |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | DOOR SWEEP | 8198AA | AA | ZER |

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 087100
DOOR HARDWARE

HW SET: 33
DOOR(S): 137, 226

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 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 | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HW SET: 34SW
DOOR(S): 118A

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 NRP | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | L9070T 06L | 626 | SCH |
| 1 | EA | PRIMUS CORE | 20-740 | 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 | WS401/402CVX | 626 | IVE |
| 1 | EA | GASKETING | 870AA-S | AA | ZER |
| 1 | EA | AUTO DOOR BOTTOM | 360AA | AA | ZER |
| 1 | EA | THRESHOLD | 601CP- 4" | A | ZER |

END OF SECTION

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. Low-energy door operators for swinging doors.
- B. Key Abbreviations include the following:
 - 1. ADO Automatic Door Operators
- C. Related Sections:
 - 1. Section 087100 "Door Hardware".
 - 2. Division 26 Electrical for installation of control devices and power requirements.

1.3 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Double-Egress (Doors): A pair of doors that simultaneously swing with the two doors moving in opposite directions with no mullion between them.
- C. Double-Swing (Doors): A pair of doors that swing with the two doors moving in opposite directions with a mullion between them; each door functioning as a single-swing door.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For automatic door operators.
 - 1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
 - 2. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Product certificates.

- B. Field quality-control reports.
- C. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation and maintenance of units required for this project.
- B. Certified Inspector Qualifications: Certified by the AAADM.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion of the Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. KM Systems, Inc.

2.2 AUTOMATIC DOOR OPERATORS, GENERAL

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and according to UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
 - 1. Wind Load: Provide door operators on exterior doors that will open and close doors and maintain them in a fully closed position when subjected to wind loads of 47 Kips.
- B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation and safety-device wiring, and manual operation including spring closing when power is off.

- C. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch thick, extruded or formed aluminum; continuous over full width of operator-controlled door opening; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.
- D. Brackets and Reinforcements: Fabricated from aluminum with non-staining, nonferrous shims for aligning system components.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 LOW-ENERGY DOOR OPERATORS

- A. Standard: BHMA A156.19.
- B. Performance Requirements:
 - 1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
 - 2. Entrapment-Prevention Force: Not more than 15 lbf required to prevent stopped door from closing or opening.
- C. Configuration: Operator to control single swing door.
 - 1. Traffic Pattern: Two way.
 - 2. Operator Mounting: Surface.
- D. Configuration: Operator to control pair of swinging doors.
 - 1. Traffic Pattern: Two way.
 - 2. Mounting: Surface.
- E. Operation: Power opening and spring closing. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.
- F. Operating System: Electromechanical.
- G. Microprocessor Control Unit: Solid-state controller.
- H. Features:
 - 1. Adjustable opening and closing speed.
 - 2. Adjustable opening and closing force.
 - 3. Adjustable backcheck.
 - 4. Adjustable hold-open time from zero to 30 seconds.
 - 5. Adjustable time delay.
 - 6. Adjustable acceleration.
 - 7. Obstruction recycle.
 - 8. On-off/hold-open switch to control electrical power to operator; key operated.

- I. Activation Device: Push-plate switch on each side of door to activate door operator.
- J. Exposed Finish: Finish matching door hardware.
- K. Electrical: Furnish and install all wiring to operator under Division 26. Provide 120VAC, 60 HZ, 1 phase, 15 amp service to each single operator (20 amp service to each pair) on a separate, dedicated circuit routed into the header.

2.4 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Extrusions: ASTM B 221.
 - 2. Sheet: ASTM B 209.
- B. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 CONTROLS

- A. General: Provide controls according to BHMA standards for condition of exposure and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate devices with door operation and door operator mechanisms.
- B. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.
 - 1. Configuration: Square push plate with 4-by-4-inch junction box.
 - a. Mounting: Surface mounted on wall, 30-inches above finished surface to center of plate.
 - 2. Configuration: Rectangular push plate with 2-by-4-inch junction box.
 - a. Mounting: Surface mounted on post, 30-inches above finished surface to center of plate.
 - 3. Push-Plate Material: Stainless steel as selected by Architect from manufacturer's full range.
 - 4. Message: International symbol of accessibility and "Push to Open".
- C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.6 FABRICATION

- A. Factory fabricate automatic door operators to comply with indicated standards.

- B. Fabricate exterior components to drain condensation and water passing joints within operator enclosure to the exterior.
- C. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk phillips flat-head machine screws, finished to match operator.

2.7 ACCESSORIES

- A. Signage: As required by cited BHMA standard for type of door and its operation.
 - 1. Application Process: Decals Operator manufacturer's standard process.
 - 2. Provide sign materials with instructions for field application when operators are installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install automatic door operators according to manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.
- B. Controls: Install devices according to manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel.
- C. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.
- D. Adjusting: Adjust automatic door operators to function smoothly and for weathertight closure, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.
 - 1. Readjust automatic door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).
- E. Demonstration: Engage factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators.

3.2 FIELD QUALITY CONTROL

- A. Certified Inspector: Engage a Certified Inspector to test and inspect components, assemblies, and installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
 - 1. Test and inspect each automatic door operator installation, using AAADM inspection forms, to determine compliance of installed systems with applicable BHMA standards.

- C. Automatic door operators will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 087113

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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.
2. Doors.
3. Curtain Wall and Storefront framing.
4. Interior borrowed lites (relights, sidelites, transoms).
5. Glazing sealants and accessories.

- B. Key Abbreviations include the following:

- | | | |
|----|------|------------------------------------|
| 1. | GLZ | Glass/Glazing |
| 2. | IGL | Insulating Glazing (ISGL-#) |
| 3. | ISGL | Insulating Safety Glazing (ISGL-#) |
| 4. | SGL | Safety Glazing |

- C. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for doors and frames that receive glazing.
2. Section 081416 "Flush Wood Doors" for doors that receive glazing.
3. Section 084113 "Aluminum-Framed Entrances & Storefronts" for doors and frames that receive glazing.
4. Section 084413 "Glazed Aluminum Curtain Walls" for frames that receive glazing.
5. Section 085113 "Aluminum Windows" for windows with factory glazing.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, as defined in referenced glazing publications.
- B. Glass Fabricators: Firms that produce insulating glass, laminated, and other fabricated glass products.
- C. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- D. IBC: International Building Code.

- E. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
 - 1. Coated glass.
 - 2. Insulating glass.
- D. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. 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.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for coated glass & insulating glass.
- B. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is certified by coated-glass manufacturer.
- B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

- C. Source Limitations for Glass: Obtain coated float glass laminated glass and insulating glass from single source from single manufacturer for each glass type.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- E. 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.
- F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.8 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 instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD 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 are below 40 deg F.

1.10 WARRANTY

- A. Manufacturer's Special 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 Special 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: 5 years from date of Substantial Completion.

- C. Manufacturer's Special 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

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

- A. Float Glass (GLZ): ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
 - a. Guardian Industries Corp.
 - b. Pilkington North America
 - c. PPG Industries, Inc.
 - d. Others only as approved prior to bidding.
- B. Heat-Treated Float Glass (GLZ): ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
 - 1. For uncoated glass, comply with requirements for Condition A.
 - a. Roll wave distortion: Limit top-to-bottom of wave to .005" maximum.
 - b. Orient roll wave in horizontal position unless width is >84"
 - 2. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 LAMINATED GLASS (SAFETY GLASS)

- A. Fabricators/Laminators: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
 - 1. Garibaldi Glass
 - 2. Hartung Glass Industries
 - 3. Northwestern Industries
 - 4. Oldcastle Building Envelope
 - 5. Vitrum Industries
- B. Laminated Glass (SGL): ASTM C 1172, and complying with testing requirements in 16 CFR 1201 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 interlayer to comply with interlayer manufacturer's written recommendations.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.
- C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 INSULATING GLASS

- A. Fabricators: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
 - 1. Garibaldi Glass- Burnaby, BC
 - 2. Hartung Glass-Seattle, WA
 - 3. Northwestern Industries-Seattle, WA
 - 4. Oldcastle Building Envelope-Battle Ground, WA
 - 5. Viracon-Owattona, MN
 - 6. Vitrum Industries-Langley, BC
 - 7. Others only as approved prior to bidding.
- B. Insulating Glass Units (IGL) (ISGL): Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 - 1. Sealing System: Dual seal, with polyisobutylene and silicone primary and secondary.
 - 2. Spacer: Manufacturer's standard spacer material and construction.
 - 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- C. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article.

2.5 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: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazing.
- C. Structural Performance: Glass thicknesses indicated are minimums required and are for detailing only. Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
 - 1. Design Wind Pressures: As indicated on Drawings.
 - 2. Design Snow Loads: As indicated on Drawings.
 - 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: The center-of-glass deflection of the glazing shall be limited so that all of the following requirements are met:
 - a. The structural capacity of the glazing composition is not exceeded.
 - b. The glazing composition remains reliably engaged with a suitable margin of safety under the most critical design condition.
 - c. The center-of-glass deflection does not exceed 1".
 - d. The center-of-glass deflection does not exceed the short side dimension of the unit divided by 100.

5. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
 6. Safety Glazing: Provide safety glazing where indicated and where required by applicable codes.
- A. 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, ambient; 180 deg F, material surfaces.

2.6 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. EPDM complying with ASTM C 864.
 2. Silicone complying with ASTM C 1115.
 3. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, 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.

2.7 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 shall comply with South Coast Air Quality Management District, SCAQMD, Rule 1168.
 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include the following:
 - a. Dow Corning Corporation; 790.

- b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
- c. May National Associates, Inc.; Bondaflex Sil 290.
- d. Pecora Corporation; 890.
- e. Sika Corporation, Construction Products Division; SikaSil-C990.
- f. Tremco Incorporated; Spectrem 1.
- g. Others only as approved prior to bidding.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and non-migrating 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 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. 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.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with 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.

2.10 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.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- 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.

2.11 MONOLITHIC-GLASS TYPES

- A. Glass Type GLZ: Clear float glass or heat-strengthened float glass.
 - 1. Thickness: As required to suit conditions of installation, minimum 6.0 mm.

2.12 LAMINATED-GLASS TYPES

- A. Glass Type SGL: Clear laminated glass with two plies of heat-strengthened float glass.
 - 1. Thickness of Each Glass Ply: As required to suit conditions of installation, minimum 3.0 mm.
 - 2. Interlayer Thickness: 0.060 inch.
 - 3. Provide safety glazing labeling.

2.13 INSULATING-GLASS TYPES

- A. Glass Type IGL: Low-e-coated, clear insulating glass.
 - 1. Overall Unit Thickness: 1 inch.
 - 2. Thickness of Each Glass Lite: As required to suit conditions of installation, minimum 6.0 mm.
 - 3. Outdoor Lite: Annealed or Heat-strengthened float glass.
 - 4. Interspace Content: Air or Argon.
 - 5. Indoor Lite: Annealed or Heat-strengthened float glass.
 - 6. Low-E Coating: Sputtered on second surface.
 - a. Basis of Design: Guardian SunGuard SuperNeutral 68 (SN 68)
 - b. Acceptable: PPG Solarban 60, Viracon VE 1-2M
 - 7. Visible Light Transmittance: 68 percent minimum.
 - 8. Winter Nighttime U-Factor: 0.29 maximum.

9. Summer Daytime U-Factor: 0.28 maximum.
10. Solar Heat Gain Coefficient: 0.38 maximum.

B. Glass Type IGL-2: Low-e-coated, clear insulating glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: As required to suit conditions of installation, minimum 6.0 mm.
3. Outdoor Lite: Annealed or Heat-strengthened float glass.
4. Interspace Content: Air or Argon.
5. Indoor Lite: Annealed or Heat-strengthened float glass.
6. Low-E Coating: Sputtered on second surface.
 - a. Basis of Design: Guardian SunGuard SuperNeutral 54 (SN 54)
7. Visible Light Transmittance: 54 percent.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Solar Heat Gain Coefficient: 0.28 maximum.
10. Location: Aluminum Curtain Walls 3A, 3B, 3C, 3D, AND 3E at Lobby 102 except where insulated safety glazing is indicated.

2.14 INSULATING-LAMINATED-GLASS TYPES

A. Glass Type ISGL Low-e-coated, clear insulating laminated glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Outdoor Lite: As required to suit conditions of installation, minimum 6.0 mm.
3. Outdoor Lite: Heat-strengthened float glass.
4. Interspace Content: Air or Argon.
5. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.
 - a. Thickness of Each Glass Ply: As required to suit conditions of installation, minimum 3.0 mm.
 - b. Interlayer Thickness: 0.060 inch.
6. Low-E Coating: sputtered on second surface.
 - a. Basis of Design: Guardian SunGuard SuperNeutral 68 (SN68)
7. Visible Light Transmittance: 67 percent minimum. The laminated lite reduces the VLT by 1%
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.28 maximum.
10. Solar Heat Gain Coefficient: 0.37 maximum. The laminated reduces the SHGC by .01
11. Provide safety glazing labeling.

B. Glass Type ISGL-2 Low-e-coated, clear insulating laminated glass.

1. Overall Unit Thickness: 1 inch.

2. Thickness of Outdoor Lite: As required to suit conditions of installation, minimum 6.0 mm.
3. Outdoor Lite: Heat-strengthened float glass.
4. Interspace Content: Air or Argon.
5. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.
 - a. Thickness of Each Glass Ply: As required to suit conditions of installation, minimum 3.0 mm.
 - b. Interlayer Thickness: 0.060 inch.
6. Low-E Coating: sputtered on second surface.
 - a. Basis of Design: Guardian SunGuard SuperNeutral 54 (SN54)
7. Visible Light Transmittance: 54 percent.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Solar Heat Gain Coefficient: 0.28 maximum.
10. Provide safety glazing labeling.
11. Location: East Elevation of East Building where insulated safety glazing is indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 2. Presence and functioning of weep systems.
 3. Minimum required face and edge clearances.
 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

- A. Protect exterior 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. Immediately after installation remove nonpermanent labels and clean surfaces.
- C. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- D. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- E. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- F. Wash glass on both exposed surfaces 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 088000

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. Fixed and hinged extruded-aluminum louvers.
- B. Key Abbreviations include the following:
 - 1. MWL Metal Wall Louvers
- C. Related Requirements:
 - 1. Section 076200 "Sheet Metal Flashing and Trim" for flashing not part of the fixed louvers.
 - 2. Section 079200 "Joint Sealants" for sealants installed in perimeter joints between louver frames and adjoining construction.
 - 3. Section 081113 "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.
 - 4. Section 081416 "Flush Wood Doors" for louvers in flush wood doors.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- D. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- C. Samples: For each type of metal finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- B. Manufacturer's Instructions: Include installation instructions, special procedures, and perimeter conditions requiring special attention.

1.6 QUALITY ASSURANCE

- A. Exterior Exhaust Louvers: Conform to AMCA Certification Ratings Program for Certified Ratings Seal.
- B. Exterior Intake Storm Rated Louvers: Wind driven rain performance tested to and certified by AMCA 511 or BSRIA, HEVAC Laboratory Testing and Rating of Weather Louvers when Subjected to Simulated Rain.
- C. Structural Design of Louver: Engineer louver to resist wind load specified by Structural Notes and IBC Chapter 16 for Wind Load and Exposure.

1.7 QUALIFICATIONS

- A. Manufacturer: Member of AMCA, producing tested standard and storm rated louvers conforming to provisions of this Section.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Drainable-Blade Louver (MWL):
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Greenheck; Model ESD-635 or a comparable product by one of the following:
 - a. Airolite Company, LLC (The).
 - b. Construction Specialties.
 - c. Industrial Louvers Inc
 - d. Ruskin Company.
 - 2. Louver Depth: 6 inches.
 - 3. Frame and Blade Nominal Thickness: Not less than 0.081 inch.
 - 4. Mullion Type: Exposed.
 - 5. Louver Performance Ratings:
 - a. Free Area: Not less than 53.3%.
 - 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
 - 7. Provide hinged frame and louver where indicated on Drawings.

2.3 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached.
 - 2. Finish: Mill finish unless otherwise indicated.
- D. Louver Screening for Aluminum Louvers:
 - 1. Bird Screening: Aluminum, 5/8-inch-square mesh, 0.063-inch wire.

2.4 BLANK-OFF PANELS

- A. Uninsulated, Blank-Off Panels: Metal sheet attached to back of louver.
 - 1. Aluminum sheet for aluminum louvers, not less than 0.050-inch nominal thickness.
 - 2. Panel Finish: Same finish type applied to louvers, but black color.
 - 3. Attach blank-off panels with sheet metal screws.
- B. Insulated, Blank-Off Panels: Laminated panels consisting of an insulating core surfaced on back and front with metal sheets and attached to back of louver.
 - 1. Thickness: 2 inches.
 - 2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch nominal thickness.
 - 3. Insulating Core: Rigid, glass-fiber-board insulation or extruded-polystyrene foam.
 - 4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch nominal thickness, with corners mitered and with same finish as panels.
 - 5. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
 - 6. Panel Finish: Same type of finish applied to louvers, but black color.
 - 7. Attach blank-off panels with sheet metal screws.

2.5 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - 3. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.
 - 4. For fastening stainless steel, use 300 series stainless-steel fasteners.
 - 5. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Channel unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.
 - 1. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close-fitting blade splices designed to permit expansion and contraction.
 - 2. Semi-recessed Mullions: Where indicated, provide mullions partly recessed behind louver blades so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.
 - 3. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
- F. Provide subsills made of same material as louvers for recessed louvers.
- G. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range of standard and premium colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, 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.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089119

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. Wall penetration isolation.
 - 2. Electrical conduit isolation.
 - 3. Acoustical requirements for installation of electrical boxes.
- B. Key Abbreviations include the following:
 - 1. SW Sound Wall
- C. Related Requirements:
 - 1. Section 079200 "Joint Sealants" for acoustical joint sealants used for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
 - 2. Section 092900 "Gypsum Board" for sound attenuation blankets and related gypsum board construction.
 - 3. Section 092216 "Non-structural Metal Framing" for resilient clips and special framing requirements.
 - 4. Section 095113 "Acoustical Panel Ceilings".

PART 2 - PRODUCTS

- 2.1 Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence.
- B. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

- C. Do not begin work until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.2 ACOUSTICAL WALL CONSTRUCTION

A. Framing for double stud walls

1. The air space between the two wall frames (studs) shall be as indicated on the plans.
2. Maintain continuous separation between the two wall frames.
3. Make sure that framing members, blocking, and spacers do not connect the two wall frames.
4. Where irregularities occur, ensure separation between wall frames shall be no less than 1/2".
5. Bring to the architect's attention, prior to wall closure, any conflicts with other trades that result in unavoidable connection between the two wall frames of the double wall.

3.3 PENETRATION ISOLATION

A. Scope:

1. Penetration requirements identified in this section will be applied to all of the following:
 - a. All double stud walls
 - b. All walls with resilient Clips
 - c. All framed GWB ceilings
 - d. All resiliently suspended GWB ceilings
 - e. All Concert Hall walls
 - f. Choir, Band, Music Room, and all Practice Room walls

B. Method:

1. Isolate all ductwork, conduit and pipework (including sprinkler system) greater than 2" in diameter at penetrations as follows:
 - a. Provide a sheet metal (22 gauge) sleeve to cover the entire perimeter of a 1 inch to 1-1/2 inch (1/2 inch to 3/4 inch on each side) oversized penetration cut. Penetration openings that are framed on all sides of the partition do not require the structural sleeve. Oversize framing penetration as called for openings with sleeves.
 - b. Plaster or caulk sleeve to the wall, ceiling, or floor, to ensure an airtight seal.
 - c. If ductwork or pipework penetrates a double wall, use a separate sleeve at each side of the wall (allow no sleeve connection between walls).
 - d. Pack the gap between the penetrating duct or pipe and the sleeve with Acoustical Insulation and seal airtight on both sides of the wall, floor, or ceiling with an outer layer of Acoustical Sealant.
 - e. Do not use wall, floor, or ceiling penetrations to support pipework or ductwork. Support pipe or duct just prior to and just after the penetration, so that the pipe or duct is centered in penetration

- f. Use the above penetration treatment regardless of the existence of external duct or pipe insulation. Size penetration large enough to pack additional Acoustical Insulation and apply Acoustical Sealant between the external insulation and the sheet metal sleeve.
- 2. Isolate all conduit and pipework (including sprinkler system) less than or equal to 2" in diameter at penetrations as follows:
 - a. Oversize penetration by 3/8 inch on each side.
 - b. Seal gap airtight with Acoustical Sealant.
 - c. Do not use wall, floor, or ceiling penetrations to support pipework or ductwork. Support pipe or duct just prior to and just after the penetration, so that the pipe or duct is centered in penetration.
 - d. Use the above penetration treatment regardless of the existence of external duct or pipe insulation. Size penetration large enough to apply Acoustical Sealant between the external insulation and the penetration.

3.4 ELECTRICAL CONDUIT ISOLATION

- A. Use flexible electrical conduit to isolate all electrical connections between acoustical walls and other walls or structure.
- B. Do not use conduit clamps or hangers between the flex conduit and acoustical walls.
- C. Flex conduit shall be minimum 3 feet long.

3.5 ELECTRICAL BOXES

- A. Do not place electrical boxes back-to-back within one stud cavity.
- B. Offset back-to-back boxes a minimum distance of 18" for single stud walls and a minimum offset of 36" for double stud walls (with at least one stud between the boxes).
- C. Fill the cavity around the box with fiberglass insulation.
- D. Mud rings must have backboxes.
- E. Seal between boxes and wallboard with Acoustical Sealant.
- F. Seal all openings in boxes and backboxes with Acoustical Sealant.
- G. For double stud walls, run wiring on the side of the wall that it serves, only. Locate junction boxes to combine wiring outside of double wall.
- H. Bring to the architect's attention, prior to wall closure, any conflicts with other trades that result in unavoidable connection between the two wall frames of a double wall.

3.6 ACOUSTICAL SEALANT INSTALLATION

- A. Partitions must be sealed, top, sides, and base with silicone-base, non-hardening caulking. Refer to Section 079200 "Joint Sealants".

END OF SECTION 092118

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. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.
- 3. Supplementary framing and blocking to support fixtures, equipment, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

- B. Key Abbreviations include the following:

- 1. DTC Deflection Track Channel
- 2. GBCSS Gypsum Board Ceiling Support System
- 3. HCH Hat-Shaped Furring Channel
- 4. NLMF Non-Load Bearing Steel (Metal) Framing
- 5. RCLP Resilient Clips
- 6. ZCH Z-Shaped Furring Channel

- C. Related Requirements:

- 1. Section 054000 "Cold-Formed Metal Framing" for exterior non-load-bearing wall studs.
- 2. Section 061000 "Rough Carpentry" for prefabricated composite plywood and metal backing panels installed between metal studs for fastening of surface mounted equipment and furnishings.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For embossed steel studs and tracks, firestop tracks, post-installed anchors, and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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 E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Provide appropriate member sizes, spacings, and gauges in accordance with ICC-ES Report No. ER-3064P to comply with the requirements listed below. Provide calculations stamped by a licensed professional engineer for conditions not included in span tables.
 - 1. Maximum lateral deflection of walls shall be L/120 under a 5 PSF lateral pressure. Do not vary stud widths from architectural drawings without prior approval. Install appropriate headers and jamb studs at wall openings to support wall and ceiling loads.
 - 2. Size ceiling joists for a maximum L/480 deflection.

2.2 FRAMING SYSTEMS (NLMF)

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Framing Members, General:
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized unless otherwise indicated.
- C. Studs and Tracks: ASTM C 645.
 - 1. Steel Studs and Tracks:
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) CEMCO; California Expanded Metal Products Co.
 - 2) ClarkDietrich Building Systems.

- 3) SCAFCO Steel Stud Company.
 - b. Minimum Base-Metal Thickness: 0.018 inch.
 - c. Depth: As indicated on Drawings.
- D. Slip-Type Head Joints (DTC): Where indicated, provide the following in width to accommodate depth of stud:
 1. Single Long-Leg Track System: ASTM C 645 top track with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 2. Double-Track System: ASTM C 645 top outer tracks, inside track with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
 3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Blazeframe Industries; Bare Slotted Track (BST/BST 2).
 - 2) ClarkDietrich Building Systems; MaxTrak Slotted Deflection Track.
- E. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Blazeframe Industries; Intumescent Framing, Fire Stop System.
 - b. CEMCO; California Expanded Metal Products Co; FAS Track.
 - c. Clark Dietrich Building Systems; BlazeFrame or MaxTrak.
- F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing complying with ASTM C 645.
 1. Minimum Base-Metal Thickness: 18 gage, unless adjacent metal studs are heavier gage, then match gage of studs.
 2. Minimum Width and Configuration: 6-inches; continuous metal track channel with cut flanges as necessary for passage over framing members. Fasten backing at each stud with three (3) sheet metal truss-head screws.
 3. Quantity: Provide single continuous backing strip at typical wall-mounted item locations, except provide two (2) continuous parallel backing strips at upper wall-mounted cabinets located at top and bottom edges of the cabinets.
- G. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 1-1/2 inches, unless otherwise noted.
 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
- H. Hat-Shaped, Rigid Furring Channels (HCH): ASTM C 645.
1. Minimum Base-Metal Thickness: 0.018 inch.
 2. Depth: As indicated on Drawings.
- I. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical or hat shaped.
 2. Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; RC Deluxe Resilient Channel or a comparable product.
- J. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: As indicated on Drawings.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- K. Z-Shaped Furring (ZCH): With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- L. Resilient Sound Isolation Clips (RCLP).
1. Acceptable Products:
 - a. Pac International; RSIC-1
 - b. Kinetics; Isomax
 - c. Pliteq; GenieClip
- M. Ponywall Support: Ponywall supports, manufactured by Scafco Specialty Products, or equal. Support stud centered and welded to pre-punched base plate, G90 galvanized coating, in heights as required per Drawings.
- 2.3 SUSPENSION SYSTEMS (GBCSS)
- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Hanger Attachments to Concrete:
1. Anchors: Capable of sustaining a load equal to 5 times that imposed as determined by ASTM E 488.

- a. Type: Postinstalled, expansion anchor.
- 2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
 - 1. Depth: 1-1/2 inches.
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
 - 2. Steel Studs and Tracks: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0329 inch.
 - b. Depth: As indicated on Drawings.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: 0.0329 inch.
 - 4. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; Drywall Grid Systems.
 - c. United States Gypsum Company; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Acoustical Isolation Tape:

1. Foam Gasket – Acoustical: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8" thick, in width to suit steel stud size.
- C. Acoustical Sealant:
 1. As specified in Section 079200 "Joint Sealants".
- D. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- E. Isolation Strip at Exterior Walls: Provide the following:
 1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking, whether or not indicated, to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, casework, door

hardware, MDF wall paneling, railings, visual display surfaces, signage, miscellaneous specialties, window treatments, or similar construction.

- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacing indicated, but not greater than spacing required by referenced installation standards for assembly types.
 - 1. 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against dissimilar metals, install isolation strip between studs and dissimilar metal.
- C. Install studs so flanges within framing system point in same direction.
- D. 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 that penetrate 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 track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch 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.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches 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 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 from corner and cut insulation to fit.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacing indicated, but not greater than spacing required by referenced installation standards for assembly types.
- 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 spacing 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.
 3. Do not attach hangers to steel roof deck.
 4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 6. 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. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

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. Interior gypsum board.
- 2. Sound attenuation blankets.

- B. Key Abbreviations include the following:

- 1. CJ Control Joint
- 2. GB Gypsum Board
- 3. PGB Perforated Gypsum Board
- 4. SAB Sound Attenuation Blankets

- C. Related Requirements:

- 1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
- 2. Section 072100 "Thermal Insulation" for insulation and vapor retarders installed in assemblies that incorporate gypsum board.
- 3. Section 079200 "Joint Sealants" for sealing perimeter joints of gypsum board partitions to reduce sound transmission and other applications.
- 4. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
- 5. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.
- 6. Section 099123 "Interior Painting" for paint primers applied to gypsum board surfaces.

1.3 ACTION SUBMITTALS

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

1.4 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.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 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 E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half or preconsumer recycled content not less than 20 percent.
- B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X (GB): ASTM C 1396/C 1396M.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Georgia-Pacific Building Products.
 - d. National Gypsum Company.
 - e. United States Gypsum Company.
 - 2. Thickness: 5/8 inch.

3. Long Edges: Tapered.
4. Fire-rated gypsum board is required throughout.

2.4 SPECIALTY GYPSUM BOARD

A. Perforated Gypsum Board (PGB):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Gypsoorb, LLC.; Sonus Square 8/18 with non-woven fabric backing, Charcoal Gray.
 - b. Or equal
2. Thickness: 1/2 inch.
3. Open Area: 19.8%.
4. Perforation Type: 8mm square.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
 - a. Cornerbead.
 - b. L-Bead: L-shaped; exposed long flange receives joint compound.
 - c. Expansion (control) joint (CJ).

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Fry Reglet Corporation.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Chemical Conversion Coat Finish: Treatment of aluminum moldings shall conform with ASTM ND1730- 67 (1998), Type B suitable for field priming and painting.
4. Reveals:
 - a. Reveal Molding
 - 1) DRM 50-50 where shown on Drawings.
 - 2) DRMF 50-50 where shown on Drawings.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- 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 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.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- C. Sound-Attenuation Blankets (SAB): ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- E. Vapor Retarder: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- 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.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- 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 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. Start installation of panels at exterior wall to position butt joints as far away from exterior wall as possible.
- F. Maintain 3/8-inch clearance from bottom of wall panel and top of floor. Seal with acoustical sealant.
- G. Form control and expansion joints with space between edges of adjoining gypsum panels.
- H. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- I. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-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.
- J. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- K. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
 - 1. Caulk bead shall fill gap and be not less than 3/8" deep.

3.3 INSTALLATION OF SOUND-ATTENUATION BLANKETS

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members. Install without gaps or voids. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness to achieve R-value.
- E. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.4 APPLYING INTERIOR GYPSUM BOARD

- A. Single-Layer Application:
 - 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 horizontally (perpendicular 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.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-shaped 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 supports with steel drill screws.
- B. Multilayer Application:
 - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 2. 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.

3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.5 INSTALLING 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 C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. L-Bead: Use where indicated.

3.6 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 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: Concealed areas at walls not required to be fire-resistive construction or sound-rated assemblies at unfinished spaces.
 2. Level 2: Apply to concealed wall construction such as behind cabinets, lockers and wainscoting.
 3. Level 3: Apply to mechanical and electrical utility areas not scheduled for paint finish.
 - a. Surfaces free of excess compound.
 - b. Tool and ridge marks not accepted.
 4. Level 4: At panel surfaces that will be exposed to view as standard level of finish for project. Typical throughout project unless otherwise indicated.
 - a. No wall texturing is to be applied.

3.7 PROTECTION

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

END OF SECTION 092900

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. Ceramic tile interior wall and floor installations.
2. Tile backing panels.
3. Mortar, grout, joint sealants and other accessories

- B. Key Abbreviations include the following:

- | | | |
|----|------|--------------------|
| 1. | CEMB | Cement Board |
| 2. | CT | Ceramic Tile |
| 3. | CTF | Ceramic Tile Floor |
| 4. | CTW | Ceramic Tile Wall |
| 5. | MES | Metal Edge Strip |

- C. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
2. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 SYSTEM DESCRIPTION – CERAMIC TILE

- A. Walls, Thin-Set: TCA Method W244F (Fiber Cement Backer Board): Ceramic tile, thin-set latex-Portland cement mortar bond coat, Fiber Cement ceramic tile backer board and vapor barrier. Installed over metal stud walls specified in 092216.
- B. Concrete Floor Slab, Slab-On-Grade, Thin-Set: TCA Method F113 (Latex-Portland Cement Mortar). Ceramic tile on thin-set latex-Portland cement bond coat.
- C. Concrete Topping Slab, Thin-Set: TCA Method F122 (Thin-Set). Ceramic tile, latex-Portland cement mortar bond coat. Install on liquid applied waterproof membrane.

1.4 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

1.5 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028.
 - 1. Level Surfaces: Minimum 0.6.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from the same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Minimum one full carton for each tile unit color and size used, clean and labeled as to manufacturer and product.
 - 2. Ceramic Tile Penetrating Sealer: Minimum one gallon in manufacturer's container, unopened and clearly labeled with manufacturer's logo and instructions for use.
 - 3. Maintenance Cleaning Agent: 5 gallons in manufacturer's unopened container, clearly labeled with manufacturer's logo and instructions for use.
 - a. Submit maintenance stock to Owner. Obtain Owner's signed receipt from authorized representative.
- B. Manufacturer's standard cleaning instructions and maintenance guide.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.
- B. Do not install adhesives in unventilated areas.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Cementitious backer units.
 - 2. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.3 TILE PRODUCTS

- A. Ceramic Floor Tile Type (CTF-1): Porcelain tile.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile; Exhibition or a comparable product by one of the following:
 - a. Others only as approved prior to bidding.

2. Composition: Porcelain.
3. Module Size: 12" x 24".
4. Thickness: 3/8 inch.
5. Surface: Unpolished and Textured.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Tile Color: Black EX05.
8. Tile Pattern: As shown on drawings.
9. Grout Color: Laticrete; Raven 45
10. Grout Joint Spacing: 1/8-inch.

B. Ceramic Wall Tile Type (CTW-1): Porcelain wall tile.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile; Elevare or a comparable product by one of the following:
 - a. Others only as approved prior to bidding.
2. Module Size: 6" x 18"
3. Thickness: 5/16 inch.
4. Tile Color: Matte Lunar EL47.
5. Tile Pattern: As shown on drawings.
6. Grout Color: Laticrete; Bright White 44.

C. Ceramic Wall Tile Type (CTW-2): Glazed porcelain wall tile.

1. Basis-of-Design Product: Subject to compliance with requirements, provide United Tile; Keraben Essentials or a comparable product by one of the following:
 - a. Others only as approved prior to bidding.
2. Composition: Porcelain.
3. Series: Cavity White.
4. Module Size: 16" x 47".
5. Thickness: 3/8 inch.
6. Finish: Matte.
7. Tile Color: White.
8. Tile Pattern: As shown on drawings.
9. Grout Color: Laticrete; Bright White 44.
10. Grout Joint Spacing: 1/16-inch.
11. Provide manufacturer's standard trim shapes (bullnose) where necessary to eliminate exposed edges.

2.4 TILE BACKING PANELS (CEMB)

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. C-Cure; C-CureBoard 990.

- b. Certain Teed Corporation; FiberCement Backer Board.
 - c. Custom Building Products; Wonderboard.
 - d. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - e. James Hardie Building Products, Inc.; Hardiebacker.
 - f. National Gypsum Company; PermaBase BRAND Cement Board.
 - g. USG Corporation; DUROCK Cement Board.
 - 2. Thickness: 5/8 inch.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- B. Provide Cementitious Backer Board behind all wall tile in toilet rooms and other areas tile is scheduled.
- 1. 2-inch wide coated fiberglass mesh tape for joints.

2.5 MORTAR MATERIALS

- A. Conform to TCA for Heavy Performance Level.
- B. Thin-Set Bond Coat: Mortar conforming to ANSI A118.1 with high-polymer, liquid acrylic additive used in place of water, conforming to ANSI A118.4.
- 1. Basis of Design Product: Subject to compliance with requirements, provide Laticrete 254 Platinum Latex Thin-Set Mortar Additive or a comparable product by one of the following:
 - a. Bostik, Inc.
 - b. MAPEI Corporation.

2.6 GROUT MATERIALS

- A. Unsanded Grout – Joints Under 1/8-inch Wide: Colored, mildew resistant grout conforming to ANSI A118.6.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete Permacolor Select, or a comparable product by one of the following:
 - a. Bostik, Inc.
 - b. Custom Building Products, Polyblend.
 - c. MAPEI Corporation.
- B. Sanded Grout for Tile Joints 1/8-inch or Wider: Polymer modified, colored grout, conforming to ANSI 118.6.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete Permacolor, or a comparable product by one of the following:
 - a. Bostik, Inc.
 - b. Custom Building Products, Polyblend Sanded.
 - c. MAPEI Corporation.

- C. Epoxy Grout: Colored, multi-component epoxy resin, chemical, stain, and shock resistant compound conforming to ANSI A118.3. Suitable for horizontal tile joints 1/16-inch to 1-inch wide, and vertical tile joints 1/16 to 3/8-inch wide.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete Spectralock Pro Premium, or a comparable product by one of the following:
 - a. Bostik, Inc.
 - b. MAPEI Corporation.

2.7 ACCESSORIES

- A. Metal Edge Strips (MES-1) CTF to CPT: Trapezoid-perforated anchoring leg which is secured in the mortar bond coat beneath the tile and a sloped surface. Align top edge with ceramic tile floor surface and conform to ADA requirements.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Schluter Systems L.P.; Reno-U – Anodized aluminum.
- B. Metal Cove-Shaped Profile (MES-2): Trapezoid-perforated anchoring leg which is secured in the mortar bond coat and a cove section that forms the visible surface with a 3/8" radius.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Schluter Systems L.P.; Dilex-AHK – Satin anodized aluminum.
- C. Metal Edge Trim Outside Corner (MES-3): Profile with square visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout spacer; satin anodized aluminum.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Schluter Systems L.P.; Quadec
- D. Waterproof Membrane: Conform to ANSI A118.10.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Bostic; Hydroment, Ultra-Set.
 - b. Laticrete; Hydroban & Anti-Fracture.
 - c. MAPEI; PRP 315.
- E. Cleavage Membrane: 10-mil polyethylene sheeting, or as accepted by Architect.
- F. Interior Expansion Joints, Joint Sealant: Conform to TCA, EJ171. Match colors and textures of grout (sanded and unsanded). Hydroment, CHEM-Calk 900, one-part urethane sealant for tile.

ASTM C 920, Class 25, non-sag, ASTM D 2244 Durometer Hardness 35, specified for type and quality.

- G. Ceramic Tile Penetrating Sealer: Two coat application, specified for type and quality:
 - 1. Aqua Mix Inc.; Sealer's Choice 15, water-based penetrating sealer.
 - 2. Bostik; CeramaSeal, Silox 8, penetrating oil and water repellant.
- H. Other Materials: Conform to TCA Standard Specifications.
- I. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with adhesives bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped ¼-inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

- D. Protect surrounding surfaces to preclude damage from work of this Section.
- E. At raised slab locations, slope surrounding tile to drain body recessed 3/8".

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors consisting of tiles 8 by 8 inches or larger.
 - c. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Evenly mix color and shade variations. Mix ceramic tile from different containers.
- G. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths.
 - 1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- H. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 inch.
 - 2. Pressed Floor Tile: 1/4 inch.
 - 3. Glazed Wall Tile: 1/16 inch.
 - 4. Porcelain Tile: 1/4 inch.

- I. Pointing and Grouting:
 - 1. Tool joints full and flush without voids or pinholes.
 - 2. Clean excess grout from tile surface as work progresses.
- J. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- K. Cut neatly around bases, trim, fixtures, and similar conditions.
- L. Damp cure ceramic tile installations for 3 days in accordance with TCA and ANSI standards.
- M. Unspecified Installation Conditions: Conform to TCA Methods and verify with Architect.
- N. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- O. Metal Edge Strips: Install where exposed edge of tile flooring meets other flooring that finishes flush with top of tile.

3.4 TILE BACKING PANEL INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- B. Install behind ceramic tile wall installations. Moisture-resistant gypsum board not accepted as backer for ceramic tile.

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Provide at all toilet rooms on elevated concrete slabs.
- C. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.7 GROUT SEALER

- A. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.8 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.9 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093013

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 acoustical panels and exposed suspension systems for interior ceilings.
- B. Key Abbreviations include the following:
 - 1. ABD Acoustical Board
 - 2. APC- # Acoustical Panel Ceiling
 - 3. APCSS Acoustical Panel Ceiling Suspension System
- C. Related Requirements:
 - 1. Section 095114 "Specialty Ceilings" for wood ceiling panels with concealed suspension system and associated trims and accessories.
- D. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch-square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-long Samples of each type, finish, and color.
- C. Delegated-Design Submittal: For seismic restraints for ceiling systems.
 - 1. Include design calculations and layout drawings for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Coordinate with mechanical and electrical work.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- B. Evaluation Reports: For each acoustical panel ceiling suspension system, from ICC-ES.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For acoustical panel ceiling systems to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Furnish quantity of full-size units equal to 2% of amount installed for panel types APC-1 and APC-3I.
 - 2. Submit maintenance stock to Owner. Obtain signed receipt from Owner's authorized representative.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- 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: Class A according to ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.
- C. 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 or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS

- A. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264, and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- B. APC-1: Suspended Acoustical Panel Ceiling
 - 1. Basis-of Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Canyon; #1491, or a comparable product by one of the following:
 - a. CertainTeed Ceilings; Symphony M, 1210-OVT-1.
 - b. United States Gypsum Company; Mars #87187
 - 2. Material: Mineral fiber with acoustically transparent membrane.
 - 3. Surface Finish: Acoustically transparent membrane with factory-applied latex paint.
 - 4. Type and Form: Type IV, Form 2, Pattern E, Fire Class A
 - 5. Color: White.
 - 6. Light Reflectance (LR): 0.80 according to ASTM E1477.
 - 7. Ceiling Attenuation Class (CAC): Not less than 35.
 - 8. Noise Reduction Coefficient (NRC): Not less than 0.60.
 - 9. Edge/Joint Detail: Square Lay-in.
 - 10. Thickness: 15/16-inch.
 - 11. Modular Size: 24 by 48 inches.
 - 12. Suspension System: 15/16" Prelude XL.
- C. APC-2: Suspended Acoustical Panel Ceiling
 - 1. Basis-of Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Canyon; #1491, or a comparable product by one of the following:
 - a. CertainTeed Ceilings; Symphony M, 1210-OVT-1.
 - b. United States Gypsum Company; Mars #87187

2. Material: Mineral fiber with acoustically transparent membrane.
3. Surface Finish: Acoustically transparent membrane with factory-applied latex paint.
4. Type and Form: Type IV, Form 2, Pattern E, Fire Class A
5. Color: White.
6. Light Reflectance (LR): 0.80 according to ASTM E1477.
7. Ceiling Attenuation Class (CAC): Not less than 35.
8. Noise Reduction Coefficient (NRC): Not less than 0.60.
9. Edge/Joint Detail: Square Lay-in.
10. Thickness: 15/16-inch.
11. Modular Size: 12 by 48 inches (24 by 48 cut to 12 by 48).
12. Suspension System: 15/16" Prelude XL.

D. APC-3: Suspended Acoustical Panel Ceiling

1. Basis-of Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Ultima #1940, or a comparable product by one of the following:
 - a. CertainTeed Ceilings; Symphony M High NRC 1220-80-1.
 - b. United States Gypsum Company; Mars #89134.
2. Material: Wet-formed mineral fiber with acoustically transparent membrane.
3. Surface Finish: Acoustically transparent membrane with factory-applied latex finish.
4. Type and Form: Type IV, Form 2, Pattern E, Fire Class A
5. Color: White.
6. Light Reflectance (LR): 0.88 according to ASTM E1477.
7. Ceiling Attenuation Class (CAC): Not less than 35.
8. Noise Reduction Coefficient (NRC): Not less than 0.80.
9. Edge/Joint Detail: Square Lay-in.
10. Thickness: 7/8-inch.
11. Modular Size: 24 by 24 inches.
12. Suspension System: 15/16" Prelude XL.

E. APC-4: Offset Pyramidal Diffuser

1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
 - a. Kinetics Noise Control; Offset Pyramidal Diffuser Panel.
 - b. Wenger; Offset Pyramidal Diffuser Panel.
2. Description: Geometric sound diffuser for lay-in ceiling.
3. Composition: 0.125 thick, thermo-molded plastic.
4. Size: 2' x 2'.
5. Fire Test Data: Class A per ASTM E84.
6. Mounting: Lay-in 15/16" suspended grid.

F. APC-5: Sound-Reflective Ceiling Panel

1. Gypsum Board cut to fit 24" x 24" suspended ceiling grid.
 - a. Primed and painted to match suspended grid color.

2.4 METAL SUSPENSION SYSTEM (APCSS)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Prelude XL 15/16" Exposed Tee System or a comparable product by one of the following:
 - 1. CertainTeed Ceilings.
 - 2. United States Gypsum Company.
- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635 and designated by type, structural classification, and finish indicated.
- C. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; pre-painted, hot-dip galvanized, with prefinished 15/16-inch wide metal caps on flanges.
 - 1. Structural Classification: Heavy-duty system.
 - 2. End Condition of Cross Runners: Override.
 - 3. Face Design: Flat, flush.
 - 4. Cap Finish: Painted to match color of acoustical unit.
- D. Transition Molding: Drywall to Acoustical ceiling.
 - 1. Pre-painted Armstrong Global White integral acoustical flange and drywall taping flange, hot dipped cold rolled steel.
 - a. 7904PF: 120-inch with 15/16" flush horizontal flange (with protective film).

2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Post-installed expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B 633, Class SC 1 (mild) service condition.
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316.
 - d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
 - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without

failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.

- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8-inch-wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.
- F. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.
 - 1. BERC2 – Beam End Retention Clip.
- G. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
 - 1. 7425 – Stabilizer Bar or approved.
- H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. 7800 - 12' Wall Molding or approved.
- B. Extruded-Aluminum Edge Moldings and Trim: Provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements. Color to match suspended ceiling grid.
 - 1. Transition Trim: Extruded aluminum perimeter trim for suspended ceiling system. Provide manufacturer's standard connectors, splice plates and accessories for a complete system. Color to match suspended grid.
 - a. Armstrong Axiom Classic Trim or approved.

- b. 10" straight transition.
- c. Include outside or inside corner post at transitions.

2.7 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079200 "Joint Sealants."

2.8 ACOUSTICAL BOARD (ABD)

- A. Acoustical Board: Black acoustic board (theater board) comprised of inorganic fibers with a black matte facing, Class A fire rating, 4'x8' boards adhesively attached to underside of metal roof deck. 2-inch thick and 3 pounds per cubic foot density.
 - a. Approved Manufacturer's: Owens Corning, SelectSound; Acoustical Solutions, Black Acoustic Board, or equal.
 - b. Location: Concert Hall above balcony seating as indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636, seismic design requirements, and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:

1. 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.
 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. 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.
 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure 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.
 5. 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.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. 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.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. 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.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:
 - a. Install panels with pattern running in one direction parallel to long axis of space.
2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

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. Solid-wood, panelized linear ceilings.
 - 2. Wood-veneer, panel ceilings.
 - 3. Concealed suspension system for wood ceiling panels.
 - 4. Trim and accessories.
- B. Key Abbreviations include the following:
 - 1. WDPC-# Wood Panel Ceiling
- C. Related Requirements:
 - 1. Division 09 Sections "Acoustical Panel Ceilings".
 - 2. Division 23 "Heating, Ventilating & Air Conditioning" Sections for work to be coordinated with ceiling.
 - 3. Division 26 "Electrical" Sections for light fixture coordination.

1.3 COORDINATION

- A. Coordinate layout and installation of wood ceilings and suspension systems with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For suspended wood ceilings.
 - 1. Include reflected ceiling plans, sections, and details, drawn to scale, showing the following:
 - a. Wood ceiling patterns and joints.
 - b. Ceiling suspension members.
 - c. Method of attaching hangers to building structure and locations of cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - d. Ceiling-mounted items including, but not limited to, light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
 - e. Ceiling perimeter and penetrations through ceiling, trim and moldings.

- C. Samples: For each exposed product and for each type, color, and finish specified, 12 inches long by 12 inches wide in size.
- D. Delegated Design Submittal: For design of seismic restraints and attachment devices.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each suspended wood ceiling, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For suspended-wood-ceiling framing systems.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver ceiling components and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
 - 1. Store materials flat and level, raised from the floor.
- B. Handle ceiling components and accessories in a manner that prevents damage.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install interior ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
 - 1. Store and acclimatize wood products in the spaces where they will be installed for a minimum of 72 hours immediately before ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design seismic restraints and attachment devices.
- B. Seismic Criteria: Provide suspended wood ceilings designed and installed to withstand the effects of earthquake motions in accordance with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies – Seismic Zones 3 & 4" and requirements of authorities having jurisdiction.

2.2 WOOD-VENEER FLAT-PANEL CEILING (WDPC-1)

- A. Wood Panels: Manufacturer's standard panels consisting of wood veneer bonded to both faces of composite-wood core with exposed edges banded with the same veneer finish as the face.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong.; Woodworks Vector, 6482W4NBE, or approved equal.
 2. Surface-Burning Characteristics: Provide products with the following characteristics when tested in accordance with ASTM E84:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 or less.
 3. Veneer Species: Beech.
 4. Panel Perforation Pattern: W4 (Round Straight).
 5. Panel NRC Rating: Not less than 0.65 when tested in accordance with ASTM C423.
 6. Panel Module: 24 by 48 inches.
 7. Panel Depth: 3/4 inch.
 8. Panel Edge: Vector.
 9. Factory Finish: Clear semigloss.
- B. Wood-Panel Accessories:
1. Attachment Clips: Manufacturer's standard screw attached to back face of panels with square-cut edges to produce concealed-grid installation and allowing downward removal of ceiling panels.
 2. Hold-Down Clips: Manufacturer's standard that maintain proper seating of kerfed panel edges.
 3. Safety Clips: Manufacturer's standard to prevent panels from dropping when disengaged from the suspension system.
 4. Veneer Edge Banding: Manufacturer's standard matching panels for treating cut edges; with pressure-sensitive adhesive backing.
- C. Grid Suspension System: ASTM C635; recommended in writing by ceiling and suspension-system manufacturers for application indicated; main- and cross-runner system complete with suspension-system components required to support ceiling units and other ceiling-supported construction.
1. Material: ASTM A653, hot-dip galvanized, cold-rolled sheet steel.
 2. Structural Classification: Heavy-duty.
 3. Face Width: 15/16 inch.
 4. Finish: Flat black.

2.3 SOLID-WOOD LINEAR-PANEL CEILING (WDPC-2)

- A. Linear Ceiling Panels: Manufacturer's standard linear panels fabricated from kiln-dried solid-wood planks free of knots and without finger joints, cracks, checks, or warp. Planks run parallel to panel length.
1. Basis-of-Design Product: Subject to compliance with requirements, provide 9Wood, Inc.; Series 2200 Lay-In Linear, or equal.

- a. Species: Western Hemlock
 - b. Member Size: 5/8" x 3 1/4"
 - c. Edge Profile: Square
 - d. Members/LF: 3
 - e. Assembly Style: Cross Piece Backer (black finish).
 - f. Panel Sizes: 2' x 8' nominal, custom size to fill entire length and width of areas as shown
 - g. Fire Rating: Class 1(A) Fire Rating
 - h. Finish: Clear Satin Lacquer
 - B. Linear-Ceiling-Panel Accessories: Linear-ceiling-panel manufacturer's accessories required to provide a complete installation of ceiling in accordance with manufacturer's written installation instructions.
 - 1. Absorptive Backing: F-Sorb Environmentally Friendly Polyester Panel. 100% recyclable, made from 65% PET-recycled fiber and 35% PET-virgin fiber. Dust free, formaldehyde free, non-allergenic, not toxic. Forrest Sound Products: (425) 646-9703
 - a. Maximum density: 25pcf
 - b. Thickness: 1 inch
 - c. NRC: .75
 - d. Fire Retardant: ASTM E-84 "A" Grade.
 - C. Grid Suspension System: ASTM C635; recommended in writing by ceiling and suspension-system manufacturers for application indicated; main- and cross-runner system complete with suspension-system components required to support ceiling units and other ceiling-supported construction.
 - 1. Material: ASTM A653, hot-dip galvanized, cold-rolled sheet steel.
 - 2. Structural Classification: Heavy-duty.
 - 3. Face Width: 15/16 inch.
 - 4. Finish: Flat black.
- 2.4 SUSPENSION-SYSTEM HANGERS, BRACES, AND TIES
- A. Metal T-Grid Suspension System: Provide standard interior Metal Heavy Duty 15/16" suspension T-Grid system using Main Runners, Cross-tees, Wall Angle or Shadow Moldings of types, structural classifications, and black 360-degree painted finishes that comply with applicable ASTM C 635 requirements. Comply with all applicable codes and ordinances.
 - B. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
 - C. Wire Hangers, Braces, Ties, Hanger Rods, Flat Hangers and Angle Hangers: Provide wires, rods and hangers that comply with applicable ASTM specifications.
 - D. Seismic Struts: Suspension-system manufacturer's standard compression struts designed to accommodate seismic forces.

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. 7800 - 12' Wall Molding or approved.
 - a. Color: Flat Black
 - 2. Vector Fixture Trim
 - a. Color: Flat Black
- B. Extruded-Aluminum Edge Moldings and Trim: Provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements. Color to match suspended ceiling grid.
 - 1. Edge Suspension Trim: Extruded aluminum perimeter trim for suspended ceiling system. Provide manufacturer's standard connectors, splice plates and accessories for a complete system. Color to match suspended grid.
 - a. Armstrong Axiom Classic Trim or approved.
 - b. 3/4" x 6" wide face.
 - c. Include outside or inside corner post at transitions.
 - d. Color: Flat Black

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine substrates and structural framing to which ceilings attach or abut, with installer present, for compliance with requirements specified in this and other sections that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.
- B. Layout: Measure each ceiling area and establish the layout of Wood Panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans in accordance with wood ceiling manufacturer's approved Shop Drawings.

3.3 INSTALLATION

- A. General: Install all products to comply with manufacturer's instructions and CISCA "Ceiling Systems Handbook."
- B. Attachments: Suspend ceiling hangers from building's structural members per manufacturer's instructions and in compliance with all local codes and regulations.
- C. Installation of Metal T-Bar Grid: Install, align, brace, tie-off, mount, handle interferences, and space suspension T-Grid in accordance with suspension manufacturer's instructions and in compliance with all local codes and regulations.
- D. Installation of Wood Panels: Install wood ceiling panels in accordance with manufacturer's installation instructions and in compliance with all local codes and regulations. Install with undamaged edges and fitted accurately to suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit, as required.
- E. Install edge moldings and trim of type indicated at perimeter of specialty ceiling area and where necessary to conceal edges of panels and suspension system.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- F. Install Absorptive Backing above wood panels for entire area of wood panel ceilings. Provide tight butt joints with concealed fasteners as required to hold absorptive backing firmly in place.

3.4 CLEANING

- A. General: Clean exposed wood surfaces of wood ceiling panels, suspension systems and trim. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace wood ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095426

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. Resilient base.
 - 2. Resilient molding accessories.
- B. Key Abbreviations include the following:
 - 1. RB Resilient Base
- C. Related Requirements:
 - 1. Section 096519 "Resilient Tile Flooring" for rubber floor tile shown to receive transition strips, as specified in this Section.
 - 2. Section 096816 "Sheet Carpeting" for carpet shown to receive transition strips, as specified in this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product indicated.

1.4 MAINTENANCE MATERIALS SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Resilient Base: Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient base installed.
 - 2. Submit maintenance stock to Owner. Obtain signed receipt from Owner's authorized representative.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain resilient base and accessories components from same manufacturer.

1.6 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 or more than 90 deg F.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 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. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE (RB)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - 3. Flexco.
 - 4. Johnsonite; a Tarkett company.
 - 5. Nora Systems, Inc.
 - 6. Roppe Corporation, USA.
- B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
 - 1. Group: I (solid, homogeneous).
 - 2. Style:
 - a. Style B, Cove.
- C. Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.

- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors: Black.

2.2 RUBBER MOLDING ACCESSORY

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Burke Mercer Flooring Products; a division of Burke Industries, Inc.
 - 3. Flexco.
 - 4. Johnsonite; a Tarkett Company.
 - 5. Nora Systems, Inc.
 - 6. Roppe Corporation, USA.
- B. Description: Carpet edge for glue-down applications, nosing for carpet, nosing for resilient flooring, reducer strip for resilient flooring, transition strips.
- C. Profile and Dimensions: As indicated.
- D. Locations: Provide rubber molding accessories in areas indicated.
- E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 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; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 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 practical 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.
- E. Do not stretch resilient base during installation.
- F. On irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Not allowed.
- H. Job-Formed Corners:
 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

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. Rubber floor tile.
- B. Key Abbreviations include the following:
 - 1. RFT Rubber Floor Tile

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of floor tile indicated.
- C. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining rubber flooring, including cleaning products and procedures including manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to floor tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1. Floor Tile: Furnish one box for every (50) boxes, or fraction thereof, of each type, color, and pattern of floor tile installed.
2. Submit maintenance stock to Owner. Obtain signed receipt from Owner's authorized representative.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile 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 or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

1.10 WARRANTY

- A. Warranty: Manufacturer's standard 5-year limited warranty.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 RUBBER FLOOR TILE (RFT)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Tarkett; Johnsonite Microtone Rubber Floor Tiles or comparable product by one of the following:
 - 1. Approved prior to bidding.
- B. Tile Standard: ASTM F 1344.
- C. Hardness: Grade 1, minimum hardness of 85, measured using Shore, Type A durometer according to ASTM D 2240.
- D. Wearing Surface: Hammered.
- E. Thickness: 0.125 inch.
- F. Size: 24 by 24 inches.
- G. Color: HNRP-LD6 Cosmology B.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. 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 floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles square with room axis, and in a grid pattern (not staggered) unless otherwise indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
 - a. Do not wash surfaces until after time period recommended by manufacturer.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. (SFF-2) Semi-sprung flooring system, wood construction, for Concert Hall Platform.

1.2 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete for concrete floor slabs

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wood sports-floor assemblies.
 - 1. For installation adhesives, including printed statement of VOC content.
 - 2. For field-applied finishes, including printed statement of VOC content.
- B. Shop Drawings: Show installation details including location and layout of floor assembly and accessories. Include expansion provisions and trim details.
- C. Selection Samples: Manufacturer's color charts showing colors and glosses available for the following:
 - 1. Floor finish.
- D. Mockup: Provide a 3' x 3' mockup of SFF-2 assembly for review, including the caulked and painted hardboard surface abutments, upper floor, finish floor, building paper, sleepers and pads.
 - 1. Ship samples to Theater Consultant for testing.
 - 2. Cost of shipping shall be included by Contractor.
 - 3. Samples shall not be returned.
- E. Qualification Data: Installer shall provide documentation of sufficient experience providing site-built sprung wood stage floors similar to the system specified herein. Substantial experience with sports floors is not sufficient.
- F. Maintenance Data: For assemblies and finish systems to include in maintenance manuals.
- G. Re-Submittals: Shall include all prior submittal content, with original markups and evidence of correction included. Failure to do so will result in submittal rejection.

1.4 QUALITY ASSURANCE

- A. Employ an installer who is regularly engaged in the installation and finishing of the type of floor specified. Installer shall have successfully completed similar installations and have at least five years' experience. If requested, installer shall provide a list of completed projects the name of the owner, a contact person, and a telephone.
- B. Pre-approved Stage Floor Fabricator / Installers are:
 - 1. A-Game Courts – Gervais, OR
 - 2. Soriano Floor Finishing – Boise, ID
 - 3. Brandsen Hardwood Floors – Portland, OR

1.5 DELIVERY, STORAGE AND PROTECTION

- A. Deliver materials to stage only when stage is clean, dry and protected from the weather. Place in an area to allow for inspection. Store all materials for a long enough period to allow all materials to acclimate to room temperature and humidity. Spread and separate materials to allow thorough acclimation. Do not stack in concentrated amounts.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of floor until stage has been enclosed and the approximate humidity and temperature of the stage has been achieved.

1.7 WARRANTY

- A. Contractor and installer shall submit a warranty agreeing to repair or replace the floors or any of their failing component parts for a period of two years after the date of Substantial Completion if the floor: shrinks, warps, peels, deteriorates excessively, experiences paint failure or in which voids in the vinyl, hardwood, plywood or hardboard appear. Said warranty shall not include normal wear and tear or demonstrable abuse.

PART 2 - PRODUCTS

2.1 (SFF-2) CONCERT HALL PLATFORM FLOOR MATERIALS

- A. Vapor Barrier: ASTM D 4397, polyethylene sheet, 6 mils minimum thickness.
- B. Shims: hardwood taper wedges, field-trimmable, without voids or defects.
- C. Pads: Acceptable kinetic pads shall be one of the following:
 - 1. Action Floors, AirTech II pad, 3/4 inch thick, 4 inch x 4 inch, 50 durometer
 - 2. Connor Rezill pad, 3/4 inch thick, 4 inch x 4 inch, 50 durometer

3. Adhere to bottom face of subfloor, with spacing not greater than 16 inches o.c., by means of permanent construction adhesive rated for bonding neoprene to wood or 4 heavy staples, per pad manufacturer's best method recommendation. Along edges and corners of subfloor, provide pad tight at corner with no cantilever of plywood beyond edge of pad.
- D. Plywood: All plywood APA standards with backstamp indicating grade mark on back side. Specifically not allowed are sheets with luan or mahogany face and inner plys.
- E. Fasteners: Use Philips head corrosion resistant deck screws (black) for attachment of upper floor/finish floor sandwich to sub-floor. Do not use nails or staples. Do not glue upper floor/finish floor sandwich to sub-floor. Finish Floor shall be glued and screwed to upper floor. Tongue and groove interface between adjacent subfloor panels shall allow for wood construction adhesive in joint. Clean flush any leakage out on top face of subfloor.
- F. Adhesive: Type recommended by installer to suit application, suitable to develop not less than 150 PSI slip and/or lift resistance between Finish Floor and Upper Floor, when roller applied evenly and pressure set for not less than 24 hours.
 1. DAP Weldwood, UPC #25330, #25332 or #25336 or functional equivalent.
 2. Do not use adhesives that contain urea formaldehyde.
 3. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Wood Glues: 30 g/L.
 - b. Contact Adhesive: 250 g/L.
- G. Sleepers: 2 x 3 kiln-dried (KD) Douglas Fir, #1 or BTR, solid, true and flat without defects. Minimum length per segment shall be 96", and ends shall be rabbeted 50% sleeper height by 4" of sleeper end run for overlap and joining. SPF or engineered multi-layer OSB sleepers are not acceptable.
- H. Upper Floor: 3/4 inch AC exterior, Douglas Fir, No. 1. Provide all sheets from same manufacturer and same lot, fully dried and flat. Install with "A" side up. No voids are allowed in face or interior. Best condition, with no water or storage damage.
- I. Building Paper: 30 lb. felt building paper.
- J. Finish Floor: 3/4" x 3-1/4" T&G Maple strip hardwood. Contractor shall confirm that the hardwood supplied shall have exceptionally high resistance to surface fiber failure when painted. Determination of suitability shall be established via a "Tape Test".
 1. Tape Test shall consist of burnishing a strip of 2" wide x 12" long Vinyl Dance Floor tape (Tapeworks #AT07 or equal) onto a sample piece of hardboard after light sanding and painting of 3 coats of the paint specified herein. Tape shall be left in place for 3 days, then quickly removed. A successful test will result in no paint or surface fibers adhering to the tape and no visible disruption to the paint or the floor.
 2. Tape Test shall be performed by Consultant, using samples sent per Submittal requirements as specified herein.
- K. Finish: Sherwin-Williams "ArmorSeal TreadPlex" Color: Natural.
 1. Volatile Organic Compound (VOC) Content:

- a. Provide coatings that comply with the most stringent requirements specified in the following:
 - b. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - c. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
 - d. Sheen shall have gloss level NO higher than minimal light reflection or eggshell. True 'flat' is not acceptable.
- L. Vented Base: Hardwood. (Architect to provide detail)
- M. Threshold/Expansion Joint: Balco #1120 gymnasium floor cover, vinyl insert color black. CRITICAL NOTE: concrete pour at expansion joint requires slight slab recess so that offstage portion of expansion joint is flush with concrete and with upper face of wood floor. Advance coordination is required.

PART 3 - EXECUTION

3.1 SFF-2 CONCERT HALL PLATFORM FLOOR INSTALLATION

- A. Install as shown and detailed on drawings. Installation area shall have been heated, dried out and normal temperature and humidity conditions shall have been in effect for at least one month. If moisture remains present, then work on the floor shall be stopped and remedies made. Transitions from finish floor to concrete floor shall be level, smooth and even; refer to details.
- 1. Concrete Slab: Slab shall be depressed, level, trowel smooth, clean, free from all moisture. In addition to any other vapor barriers under the slab, lay down a vapor barrier on top of the slab.
 - 2. Sleepers: Lay in direction shown at 16 inches on center across stage. Do not attach (nail or glue) to concrete. Shim under neoprene pads so top of sleeper is level and at correct elevation with reference to adjacent concrete floor. Also provide at perimeter of stage and around floor pockets and access holes and at unsupported edges of sub-floor.
 - 3. Upper Floor: Prior to laying down in place, attach Finish Floor to top side of Upper Floor by means appropriate adhesive, uniformly roller-applied in adequate quantity and distribution without air pockets, gaps or lumps, sufficient to provide total bonding between the two layers. Stack in a safe place on the stage, under pressure, to allow glue to dry. Once glue is dried and cured, trim glue-combined sandwich of Upper Floor and Finish Floor so that side edges of hardboard and edges of plywood upper floor are exactly aligned and square in all directions. Drill and countersink screw holes along edges and interior as shown in "A" series drawing detail, before lay-down. Underside of Upper Floor/Finish Floor sandwich shall be cleared of excess material and splinters as a result of hole drilling. Ease all top edges of Finish Floor portion of sandwich, in order to remove sharp corner of material.
 - 4. Building Paper: Lay down over upper-floor. Do not overlap edges of adjacent runs or ends of paper. In all cases, butt joint the paper. Staple tight to floor for flatness without buckling. Staples shall be tight to paper and paper tight to subfloor. Top of paper shall be free of dirt and other construction debris. Vacuum clean.

5. Edge easing shall be approximately 1/16 inch chamfer. Lay down upper floor sandwich assembly with 50% offset from joints at sub-floor in both directions, and rotated 90 degrees, so that no upper floor seam aligns with the lower floor seams.
6. Allow for expansion space at all perimeters. Upper Floor / Finish Floor sandwich assembly panels shall be set in place aligned and set with ZERO gap between adjacent panels, regardless of APA standard recommendations. Screw upper floor sandwich assembly panels to sub-floor with screws on 12 inch centers along edge of each panel, across field of each panel and at corners, with countersunk screws. Screws at corners and along edges shall be not more than 1" from edges of panels. Install tops of screw heads at 1/32" below finished surface. Provide a smooth, level, transition from top of one sheet to the next. Where uneven, shim underneath as needed.
7. Finish: Leave countersunk screw heads exposed; do not fill. Lightly disk sand to slightly roughen tempered hardboard enough to improve paint adhesion profile, without creating burrs, then clean, prepare and paint finish floor with three coats of self-priming stage floor paint (as specified herein). Ensure that prime and finish coats are allowed to freely flow down into any gap between adjacent Upper Floor / Finish Floor panels, effectively acting as a seal to prevent moisture from future maintenance damp-mopping from reaching edges of Upper Floor / Finish Floor sandwich panel.
8. Vented Base: Review extent and details prior to placement. Adhere in place. Use four foot lengths or longer. Use outside corners where required. Install inside corners neatly mitered from straight lengths. Terminate all straight lengths with portion cut from outside corner piece. Use at all locations where stage floor intercepts a wall.
9. Expansion Joint: Install expansion joint threshold in accordance with manufacturer's installation instructions observing all manufacturer's recommendations. Use anywhere the stage floor meets an adjoining floor. Threshold must be flush with both sides of floor joint. No bumps or dips allowed.
10. Caulking: Any unsealed gaps between finish floor sections of stage floor or devices cut into stage floor, shall be infilled flush with 50-year rated, acrylic, paintable caulk, then painted over with stage floor paint. Caulk application shall not restrict removal of any device plate, or cause need to re-apply caulk if device plate is removed and reinstalled.
11. Touch-up: After floor has been completed, and area has fully dried, provide additional caulking (as specified in previous paragraph) where gaps have expanded and matching paint touch-up for final finish.

3.2 OTHER TRADES

- A. Cooperate and assist other trades doing work around the stage floor, including, but not limited to the electrician installing floor pockets and access holes.

3.3 QUALITY OF WORK

- A. All work shall be carried out as described and in good order. Stage floor assembly shall be flat within 1/8 inch vertical across a 10'-0" radius area at all points on stage. Stage shall be same elevation as adjacent floor on opposite side of threshold, within 1/16 inch vertical. Floor deflection and springback shall comply with national standards, including PLASA and ANSI standards for performing arts sprung floors.

3.4 TRAINING

- A. Provide (1) one-hour session of training and familiarization to Owner's designated performing arts curriculum and custodial staff, describing the materials and methods used to construct the stage floor, and the basic features that affect the users.
- B. During the training session, instruct the owner on proper cleaning of each type of performance floor, using a damp-mop process.
- C. During the training session, instruct the Owner's representatives on how to remove and replace a damaged or worn elements of each performance floor type.
- D. A sample "script" for the items covered during training, and left behind as part of the Closeout Documents, shall be provided with returned submittals, after review.

3.5 CLOSEOUT DOCUMENTS

- A. As per Division 0, but with additional requirements as defined herein.
- B. Provide manuals for each of the floor systems, with documentation of materials used, updated as-built versions of original submittals, maintenance instructions and warranty.
- C. Include as part of the O & M manuals, an informational document which repeats in detail, the instructional information presented during training for Floor Construction, Floor Usage and Floor Maintenance. See 3.4 A, B, C and D above.

END OF SECTION 096551

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. Tufted carpet.
 - 2. Walk off mats
- B. Key Abbreviations include the following:
 - 1. CPT Carpet
 - 2. WOM Walk Off Mat
- C. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for requirements of floor substrate.
 - 2. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet installation, showing the following:
 - 1. Carpet type, color, and dye lot.
 - 2. Seam locations.
 - 3. Transition details to other flooring materials.
- C. Samples: For each type and color of carpet. Label each sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet: 12-inch-square sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet: Full width rolls equal to 3 percent of amount installed for each type indicated, but not less than 10 sq. yd
 2. Deliver to Owner uncut in clearly marked dust-proof packages. Obtain signed receipt from Owner's authorized representative.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level, or otherwise qualified by the carpeting manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.
- B. Deliver carpet in original mill protective covering with mill register numbers and tags attached.

1.10 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity

conditions are maintained at levels planned for building occupants during the remainder of the construction period.

- C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
 - 1. General Contractor shall monitor and perform periodic moisture tests of concrete slab beginning at least 60 days in advance of scheduled carpet installation date.

1.11 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent loss of face fiber, edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Loss of tuft-bind strength.
 - d. Loss of face fiber.
 - e. Delamination.
 - 3. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET (CPT-1)

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Tandus; a Tarkett company; Avant 04840, Powerbond Cushion RS. No substitutions allowed.
- B. Color: Carbon Alloy 11707.
- C. Product Characteristics:
 - 1. Flammability: Class 1 per ASTM E648.
 - 2. Smoke Density: 450 or less per ASTM E662.
 - 3. Total Thickness: 0.355 per ASTM F386.
 - 4. Installation Method: Peel & Stick.
 - 5. Fiber Content: Dynex SD nylon (Stain resist).
 - 6. Pile Characteristic: Patterned loop pile.
 - 7. Pile Thickness: 0.100 per ASTM D5848
 - 8. Stitches/Rows per Inch: 10.40 /inch.
 - 9. Gage: 5/64".
 - 10. Primary Backing: Synthetic Non-Woven.
 - 11. Secondary Backing: Powerbond Cushion RS.

12. Roll Width: 6 feet.

D. Applied Treatments:

1. Applied Soil-Resistance Eco-Ensure (Fluorine-Free Soil Protection).
2. Antimicrobial Treatment: Manufacturer's standard material.
 - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

E. Performance Characteristics:

1. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D7330.
2. Dry Breaking Strength: Not less than 100 lbf according to ASTM D2646.
3. Tuft Bind: Not less than 10 lbf according to ASTM D1335.
4. Delamination: Not less than 4 lbf/in. according to ASTM D3936.
5. Resistance to Insects: Comply with AATCC 24.
6. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
7. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
8. Electrostatic Propensity: Less than 2 kV according to AATCC 134.
9. Emissions: Provide carpet that complies with testing and product requirements of CRI's "Green Label Plus" program.

2.2 TUFTED CARPET (CPT-2)

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Tandus; a Tarkett company; Texturemap 11129, Powerbond Cushion RS. No substitutions allowed.

B. Color: Landing Zone 42808.

C. Product Characteristics:

1. Flammability: Class 1 per ASTM E648.
2. Smoke Density: 450 or less per ASTM E662.
3. Total Thickness: 0.355 per ASTM F386.
4. Installation Method: Peel & Stick.
5. Fiber Content: Dynex SD nylon (Stain resist).
6. Pile Characteristic: Patterned loop pile.
7. Pile Thickness: 0.090 per ASTM D5848
8. Stitches/Rows per Inch: 9.60 /inch.
9. Gage: 5/64".
10. Primary Backing: Synthetic Non-Woven.
11. Secondary Backing: Powerbond Cushion RS.
12. Roll Width: 6 feet.

D. Applied Treatments:

1. Applied Soil-Resistance Eco-Ensure (Fluorine-Free Soil Protection).

2. Antimicrobial Treatment: Manufacturer's standard material.
 - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

E. Performance Characteristics:

1. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D7330.
2. Dry Breaking Strength: Not less than 100 lbf according to ASTM D2646.
3. Tuft Bind: Not less than 10 lbf according to ASTM D1335.
4. Delamination: Not less than 4 lbf/in. according to ASTM D3936.
5. Resistance to Insects: Comply with AATCC 24.
6. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
7. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
8. Electrostatic Propensity: Less than 2 kV according to AATCC 134.

- 2.3 Emissions: Provide carpet that complies with testing and product requirements of CRI's "Green Label Plus" program

2.4 WALK-OFF MAT (WOM)

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Tandus; a Tarkett company; Abrasive Action II 02578, Powerbond Cushion.

- B. Color: Charcoal 19100.

C. Product Characteristics:

1. Flammability: Class 1 per ASTM E648.
2. Smoke Density: 450 or less per ASTM E662.
3. Installation Method: Glue-Down.
4. Fiber Content: TDX Nylon.
5. Pile Characteristic: Patterned loop pile.
6. Pile Thickness: 0.115 per ASTM D5848
7. Stitches/Rows per Inch: 8 /inch.
8. Gage: 1/12".
9. Primary Backing: Synthetic Non-Woven.
10. Secondary Backing: Powerbond Cushion.
11. Roll Width: 6 feet.

2.5 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.

- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
 - 1. Use adhesives with VOC content not more than 50 g/L when calculates according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.
- B. Examine carpet for type, color, pattern, and potential defects.
- C. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Once the installation is commenced, the cost of corrections of any defects encountered that are detrimental to the proper installation or appearance of the carpet will be the responsibility of the installer.

3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8-inch-wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.

- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

- A. Comply with the Carpet and Rug Institute's CRI 104 and carpet manufacturer's written installation instructions for the following:
 - 1. Pre-applied Adhesive Installation (Peel and Stick).
- B. Maintain dye-lot integrity. Do not mix dye lots in same area.
- C. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- D. Install pattern parallel to walls and borders.
- E. Do not bridge building expansion joints with carpet.
- F. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- G. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- H. Install carpet below moveable and freestanding casework.
- I. Install walk off mats wall to wall in areas shown. Install mats complying with manufacturer's instructions. Coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with the Carpet and Rug Institute's CRI 104.
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer.
 - 1. Ensure carpet is without damage or deterioration at the time of Substantial Completion.

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 096816
SHEET CARPETING

END OF SECTION 096816

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. Vinyl wall covering.
- B. Key Abbreviations include the following:
 - 1. VWC Vinyl Wall Covering (VWC-#)
- C. Related Requirements:
 - 1. Section 099100 "Painting" for priming wall surfaces.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.
- B. Samples for Initial Selection: For each type of wall covering.
- C. Samples for Verification: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 12-inch- long in size.
 - 1. Wall-Covering Sample: From same production run to be used for the Work, with specified treatments applied.
- D. Product Schedule: For wall coverings. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each wall covering, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.
- B. Lighting: Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Class A Rating; Flame-Spread Index: 25 or less.

2.2 VINYL WALL COVERING (VWC-1)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Koroseal or comparable product by one of the following:
 - 1. As approved prior to bidding.
- B. Colors, Textures, and Patterns:
 - 1. VWC-1: Koroseal; De Novo; Zeteo Linen, DN2-ZTL-10 Prima Donna Silver.
- C. Product Characteristics:
 - 1. Description: Provide mildew-resistant products in rolls from same production run and complying with the following:
 - a. FS CCC-W-408D and CFFA-W-101-D for Type II, Medium products.
 - 2. Total Weight: 20.0 oz, minimum, excluding coatings.
 - 3. Backing: Osnaburg.
 - 4. Width: 54 inches.
 - 5. Repeat: 24" vertical.

6. Flammability: Class A Fire Rated, flame spread 20.
7. Smoke Density: 45 or less.
8. Micro-vented Wall Covering: Install at interior surface of exterior walls.

2.3 CUSTOM DIGITAL VINYL WALL COVERING (VWC-2)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Koroseal Digital Wall Covering Media, or comparable product by one of the following:
 1. As approved prior to bidding.
- B. Colors, Textures, and Patterns:
 1. VWC-2: Koroseal; Custom color and graphic.
- C. Product Characteristics:
 1. Description: Provide mildew-resistant products in rolls from same production run and complying with the following:
 - a. FS CCC-W-408D and CFFA-W-101-D for Type II, Medium products.
 2. Total Weight: 20.0 oz, minimum, excluding coatings.
 3. Backing: Osnaburg.
 4. Width: 54 inches.
 5. Flammability: Class A Fire Rated, flame spread 20.
 6. Smoke Density: 45 or less.

2.4 ACCESSORIES

- A. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.
 1. Adhesive shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Primer/Sealer: Mildew resistant, complying with requirements in Section 099123 "Interior Painting" and recommended in writing by primer/sealer and wall-covering manufacturers for intended substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
- D. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- E. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 WALL-COVERING INSTALLATION

- A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.
- B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.
- C. Install strips in same order as cut from roll.
 - 1. For solid-color, even-texture, or random-match wall coverings, reverse every other strip.
- D. Install wall covering without lifted or curling edges and without visible shrinkage.
- E. Install seams vertical and plumb at least 6 inches from outside corners and 3 inches from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.
- F. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.
- G. Wrap inside of window jambs and window heads at walls indicated to receive wall covering.
- H. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.4 CLEANING

- A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wall-covering manufacturer.
- C. Replace strips that cannot be cleaned.

- D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 097200

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. This Section includes the following:
 - 1. Plastic wall panels and moldings.
- B. Key Abbreviations include the following:
 - 1. FRP Fiberglass Reinforced Plastic Panels

1.3 SUBMITTALS

- B. Product Data: For each type of product specified. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.
- C. Samples: For verification in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
- D. Product certificates: Signed by manufacturers of wall coverings certifying that their products comply with specified requirements.
- E. Maintenance data: For wall covering to include in the " Operation and Maintenance Manual" specified in Division 01. Include the following:
 - 1. Methods for maintaining panels.
 - 2. Precautions for use of cleaning materials and methods that could be detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed 5 projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Fire-Test-Response Characteristics: Provide wall coverings with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.

- C. Impact Strength: Provide product with a minimum impact resistance of 25.4 ft. x lb/sq. ft. when tested in accordance with ASTM D 256.

1.5 PROJECT CONDITIONS

- A. Maintain a constant temperature not less than 60 deg. F in installation areas for at least 10 days before and 10 days after installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements provide one of the products specified.
 - 1. Kemlite Company, Inc.
 - 2. Nudo Products, Inc.

2.2 MATERIALS

- A. Fiberglass Reinforced Plastic Panels (FRP): Highly resistant to impact, scratching and abrasion. Moisture resistant panels which do not support mold or mildew and appropriate for commercial kitchen use.
 - 1. Weight: 0.7lb/sf
 - 2. Thickness: 0.09"
 - 4. Finish: Smooth.
 - 5. Color: As selected by Architect from manufacturer's full range of standard colors.
- B. ADHESIVES
 - 1. General: Manufacturer's standard for use with specific wall covering and substrate application.
 - 2. Characteristics: Mildew-resistant, nonstaining, and strippable.
- C. ACCESSORIES
 - 1. Mouldings: Manufacturer's coordinating PVC mouldings, one-piece type, longest possible lengths.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Acclimatize wall covering materials by removing them from packaging in the installation areas not less than 48 hours before installation.
- B. Comply with manufacturer's printed instructions for surface preparation.
- C. Prepare substrates to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, and defects.
- D. Prime new gypsum board with a recommended primer.

3.2 INSTALLATION

- A. Following manufacturer's printed instructions for installation.
- B. Install mouldings in longest practical lengths. Adhere to substrate. Treat all joints and edges with appropriate mouldings.

3.3 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas. Repair or replace products that have been installed and are damaged. Clean installed products in accordance with manufacturer's instructions.
 - 1. Remove any adhesive or excess sealant from panel face using solvent or cleaner recommended by panel manufacturer.

3.4 PROTECTION

- A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION 097700

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 one-dimensional quadratic residue diffusers.
- B. Key Abbreviations include the following:
 - 1. ADP Acoustical Diffuser Panel
- C. Related Requirements:
 - 1. Section 06100 "Rough Carpentry" for prefabricated plywood backing panels to be provided as backing for Z-clip and Z-bar mounting of acoustical diffuser panels.

1.3 REFERENCES

- A. American Society for Testing & Materials (ASTM) International:
 - 1. ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 2. ISO 17497-1 and ISO 17497-2 Standard Test Methods for diffusion and scattering of acoustic materials.
 - 3. ASTM E84 Standard Test method for Surface Burning Characteristics of Building Materials.

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Surface Burning Characteristics (ASTM E84):
 - a. Flame Spread: 25 maximum.
 - b. Smoke Developed: 450 maximum.

1.5 ACTION SUBMITTALS

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

- B. Shop Drawings: Submit shop drawings showing layout, edge profiles and panel components, including mounting, hardware and finishes and/or other materials.
- C. Samples: Submit selection and verification samples of finishes, colors and textures. Samples shall be a minimum of 10"x10".

1.6 INFORMATIONAL SUBMITTALS

- A. Test Reports: Certified test reports showing compliance with specified performance requirements. All acoustic absorption tests shall be verified utilizing either ASTM C423 or ISO 354 absorption standards. All diffusion and/or scattering test data shall be, at minimum, ISO 17497-1 and/or ISO 17947-2 (AES 4-id). ASTM E84 standard test method for flame and smoke spread (fire test).

1.7 QUALITY ASSURANCE

- A. Manufacturers and installers shall have a minimum 5 years of experience in the manufacturing and installation of the materials specified. All wood products shall be manufactured utilizing AWI standards and practices.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install panels until wet work, such as concrete, is complete; the building is enclosed; and the temperature, as well as the relative humidity are stabilized at 60 – 75 degrees F and 33% MINIMUM RH and 50% MAXIMUM RH, respectively. All products constructed with wood, MDF, or other wood fiber content must be stored for at least 72 hours in the controlled environment specified herein prior to installation to allow the material to stabilize.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design Product: Subject to compliance with requirements, provide RealAcoustix LLC; RealQuad Studio 250 – One-Dimensional Quadratic Residue Diffuser.

- 1. Contact: 2437 Rulon White Blvd., Unit 8, Ogden, UT 84404; Phone (801) 782-1010; <http://www.realacoustix.com/>.

2.2 MATERIALS

- A. Alder and Birch Veneer construction with clear finish. Refer to Drawings for quantity and veneer type.
- B. MANUFACTURED UNITS
1. Thickness: 11 7/8".
 2. Sizes: As shown on Drawings.
 3. Edge Detail: Squared.
 4. Facing: Flat
 5. Sound Diffusers (ISO 17497-2): NRC or diffusion and scattering coefficients as follows.
 6. Mounting Hardware: Z-Clip and Z-Bar.

2.3 TEST DATA

| Frequency [Hz] | Scattering Coefficient | Normalized Diffusion Coefficient | Diffusion Coefficient |
|----------------|------------------------|----------------------------------|-----------------------|
| 100 | 0.026 | 0.131 | 0.695 |
| 125 | 0.042 | 0.202 | 0.713 |
| 160 | 0.069 | 0.297 | 0.737 |
| 200 | 0.122 | 0.314 | 0.725 |
| 250 | 0.542 | 0.819 | 0.920 |
| 315 | 0.260 | 0.167 | 0.581 |
| 400 | 0.527 | 0.419 | 0.672 |
| 500 | 0.799 | 0.783 | 0.868 |
| 630 | 0.892 | 0.390 | 0.606 |
| 800 | 0.780 | 0.572 | 0.706 |
| 1000 | 0.815 | 0.426 | 0.585 |
| 1250 | 0.677 | 0.513 | 0.629 |
| 1600 | 0.945 | 0.109 | 0.288 |
| 2000 | 0.992 | 0.372 | 0.475 |
| 2500 | 0.919 | 0.391 | 0.471 |
| 3150 | 0.824 | 0.490 | 0.544 |
| 4000 | 0.735 | 0.406 | 0.456 |
| 5000 | 0.958 | 0.478 | 0.513 |
| 6300 | 0.936 | 0.355 | 0.388 |

2.4 FABRICATION

- A. Veneered Wood Products: All veneered wood products shall be constructed of plywood or MDF cores with minimum B1 grade veneers on all visible exteriors. All edges shall be banded with matching veneers. No ordering of any materials shall be done until architect approves the veneer type, grain type, i.e. quarter sawn, rotary cut, etc. and matching type, i.e. book-matched, slip-matched, running match, etc. Gaps shall be maintained at a maximum 1/32". All finishes shall be non-yellowing pre-catalyzed lacquer or conversion varnish. No drips or other finish flaws shall be considered acceptable. All wood products shall meet or exceed ASTM E84 Class 'A' fire standards.

2.5 FINISHES

- A. Shop Finishing: Panels shall be shop-finished with clear pre-catalyzed lacquer finish system.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION

- A. Site Verification of Conditions: Examine installation area for compliance with all manufacturer's project environmental requirements and ensure uninstalled products have been stored and acclimatized properly prior to commencing installation. Inspect all substrates for completion and quality of work to ensure that surfaces are level, plumb, clean, dry, and completely cured from water or solvent evaporation. Do not commence installation if the structural capacity of the substrate is questionable or inadequate.
- B. Coordination with Other Trades: Coordinate with all other trades to ensure that wet work including concrete, painting, etc. in the installation area is complete, cured, and dry prior to installation. Coordinate with all other trades to verify that components associated with mechanical, electrical, lighting, data, telecommunication, audio, fire suppression and other building systems are installed behind, above or below designated installation areas prior to commencing installation. Coordinate the exact size, location and sequencing of building system components that penetrate the wood wall panels.

3.3 PREPARATION

- A. Protection: Protect all floor, wall and ceiling finishes against possible damage prior to commencing and during installation.
- B. Surface Preparation: When necessary, field measure substrates to acquire accurate dimensions of acoustical panels and submit final dimensions to manufacturer.

3.4 INSTALLATION

- A. Install acoustical panels as specified and detailed on the Drawings and according to manufacturer's guidelines and industry standards.
- B. Install acoustical panels with expansion/contraction gaps appropriate for the project and as identified in the submittal documentation.

3.5 CONSTRUCTION

- A. Interface with Other Work: Support all light fixtures, HVAC air inlet/outlet devices, speakers, signage, sprinkler heads/piping, etc. independently from acoustical panels. Contractor shall not use acoustical panels to support the weight of any other building element or component.

3.6 ADJUSTING

- A. Following initial installation, adjust mounting hardware or suspension system so that removable panels can be removed easily, yet stay safely secured upon replacement. Adjust panels so that all surfaces are aligned, flush and level or plumb and gaps in between units are of a consistent width and straight.
- B. Check that manufacturer's expansion/contraction requirements were maintained during installation. As required, adjust the mounting hardware to allow for the appropriate amount of product expansion/contraction.
- C. Remove and replace any damaged panels that cannot be repaired to the Owner's and Architect's satisfaction.

3.7 CLEANING

- A. Follow manufacturer's instructions for cleaning panels soiled during installation. Replace panels that cannot be cleaned to as new condition.

3.8 PROTECTION

- A. Upon completion of work, protect installed acoustical surfaces from damage or soiling.

END OF SECTION 098400

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 shop-fabricated panel units tested for acoustical performance, including:
 - 1. Sound-absorbing wall panels.
 - 2. Sound-diffusing wall panels.
- B. Key Abbreviations include the following:
 - 1. AWC Acoustical Wall Covering
 - 2. AWP Acoustical Wall Panel (AWP-#)

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For acoustical wall panels. Include mounting devices and details; details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge and core materials.
 - 1. Include elevations showing panel sizes and direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing from acoustical wall panel manufacturers full range.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Electrical outlets, switches, and thermostats.
 - 2. Items penetrating or covered by acoustical wall panels including the following:
 - a. Air outlets and inlets.
 - b. Speakers.
 - c. Alarms.
 - d. Sprinklers.

B. Product Certificates: For each type of acoustical wall panels, from manufacturer.

C. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For acoustical wall panels to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal recommendations.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain acoustical wall panels from single source from single manufacturer.

B. Fire-Test-Response Characteristics: Provide acoustical wall panels meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.

a. Flame-Spread Index: 25 or less.

b. Smoke-Developed Index: 450 or less.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with fabric and acoustical wall panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical wall panels until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Air-Quality Limitations: Protect acoustical wall panels from exposure to airborne odors, and install units under conditions free from odor contamination of ambient air.

C. Field Measurements: Verify locations of acoustical wall panels and actual dimensions of openings and penetrations by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 ACOUSTICAL WALL PANELS

A. Manufacturers: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

1. Acoustical Panel Systems (APS, Inc.).

2. Acoustical Solutions, Inc.
 3. Armstrong World Industries.
 4. Conwed Designscape; an Owens Corning company.
 5. Decoustics Limited; a CertainTeed Ceilings company.
 6. Golterman & Sabo
 7. Kinetics Noise Control, Inc.
 8. Lamvin, Inc.
 9. Sound Management Group LLC.
 10. Sound Seal, Inc
 11. Wall Technology, Inc.
- B. Sound-Absorbing Wall Panel (AWP-1): Manufacturer's standard panel construction consisting of facing material applied to front face, edges, and back edge border of core for a full finished edge with tailored corners.
1. Basis of Design: Kinetics Noise Control, Inc.; High Impact Hardside.
 - a. Thickness: 1-1/8 Inches.
 - b. Size: As indicated on the drawings up to a maximum 48 inches x 120 inches panel.
 - c. Core: 1-inch composite core of medium density (6-7) PCF) fiberglass board with 1/8" high impact "skin".
 - d. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
 - e. Edge Profile: Square, UNO.
 - f. Facing: 100% polyester fabric, FR 701 Style 2100 by Guilford of Maine.
 - 1) Color: As selected from fabric manufacturer's full range of colors.
 - g. Sound Absorption (ASTM C423): Noise Reduction Coefficient: 0.80 minimum.
 2. Location: As shown on Drawings, including but not limited to, Concert Hall Sound Lock walls.
- C. Sound Absorption (AWP-2): Manufacturer's standard panel construction consisting of facing material applied to front face, edges, and back edge border of core for a full finished edge with tailored corners.
1. Basis of Design: Kinetics Noise Control, Inc.; Hardside.
 - a. Thickness: 2 Inches.
 - b. Size: As indicated on the drawings up to a maximum 48 inches x 120 inches panel.
 - c. Core: 2-inch composite core of medium density (6-7) PCF) fiberglass board.
 - d. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
 - e. Edge Profile: Square.
 - f. Facing: 100% polyester fabric, FR 701 Style 2100 by Guilford of Maine.
 - 1) Color: As selected from fabric manufacturer's full range of colors.
 - g. Sound Absorption (ASTM C423): Noise Reduction Coefficient: 0.80 minimum.

2. Location: As shown on Drawings, including but not limited to, Band, Choir, and Music Tech walls.
- D. Sound-Absorbing Wall Panel (AWP-3): Manufacturer's standard panel construction consisting of facing material applied to front face, edges, and back edge border of core for a full finished edge with tailored corners.
1. Basis of Design: Kinetics Noise Control, Inc.; High Impact Hardside.
 - a. Thickness: 2-1/8 Inches.
 - b. Size: As indicated on the drawings up to a maximum 48 inches x 120 inches panel.
 - c. Core: 2-inch composite core of medium density (6-7) PCF) fiberglass board with 1/8" high impact "skin".
 - d. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
 - e. Edge Profile: Square.
 - f. Facing: 100% polyester fabric, FR 701 Style 2100 by Guilford of Maine.
 - 1) Color: As selected from fabric manufacturer's full range of colors.
 - g. Sound Absorption (ASTM C423): Noise Reduction Coefficient: 0.80 minimum.
 2. Location: As shown on the Drawings, including but not limited to, Practice Rooms and Ensemble Room.
- E. Pyramidal Wall Diffusers (AWP-4): Pyramidal diffusers designed to scatter and blend sounds for a broad range of frequencies and improve the quality of music environments.
1. Basis of Design: Kinetics Geometric Diffusers; Offset Pyramidal.
 - a. Size: 4 feet x 4 feet x 9.75 inches, unless otherwise indicated on Drawings.
 - b. Edge Detail: Rounded pencil edge thermo-molded frame formed on a pyramidal shaped unit.
 - c. Finish: Fabric facing: Manufacturer's standard 100% polyester woven fabric, FR701 Style 2100 by Guilford of Maine.
 - 1) Color: As selected by Architect from Manufacturer's full range of colors.
 - d. Flush mount Z-clips top with angle clips bottom.

2.2 MATERIALS

- A. Facing Material: Fabric from same dye lot; color and pattern as selected by Architect from manufacturer's full range.
1. Manufacturer: Guilford of Maine.
 2. Product Line/Pattern: Acoustic Textiles.
 3. Applied Treatments: Stain resistance.
- B. Mounting
1. Wall adhesive in addition to mechanical attachment

2. "Z" clips.
3. Concealed spines where panels abut.

2.3 FABRICATION

- A. General: Use manufacturer's standard construction with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage. Treat fabric wrapped panels using heat shrink process to develop fully taut facing.
- B. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 1. Square Corners: Tailor corners.
 2. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
 3. Wrap panel edges and return facing fabric 1-2 inches on back of panel. Secure fabric with adhesive applied to edges and back of panel only.
- D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch.

2.4 ACOUSTICAL WALL COVERING

- A. Acoustical Wall Covering (AWC): Acoustic and decorative wall fabric applied in vertical drops like wallpaper creating a pinnable surface with a sleek, flat finish for use as a tackable surface.
 1. Basis of Design: Autex Acoustics; Sordino.
 - a. Composition: Thermally bonded high density 100% Polyester fiber containing not less than 45% recycled material.
 - b. Roll Dimensions: 48" x 36'
 - c. Thickness: 0.39 – 0.47
 - d. Finish: Flat-pile finish.
 - e. Fire Rating: ASTM E-84, Class A
 - 1) Flame Spread < 5
 - 2) Smoke Development < 25
 - f. Color: As selected by Architect from manufacturer's full range of colors.
 - g. Mounting: Adhesive in strict accordance with manufacturer's instructions.
 - h. Provide aluminum 'J-trim', satin finish around perimeter of acoustic wall covering sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of acoustical wall panels.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with acoustical wall panel manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align and level fabric pattern and grain among adjacent units.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch.
- B. Variation of Panel Joints from Hairline: Not more than 1/32 inch wide.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098433

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 surface preparation and field painting of the following:
1. Exterior Painting:
 - a. Paint all new materials unless otherwise noted.
 2. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as primer, intermediate or finish coats.
 3. Priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
 4. Work includes painting of all exterior items noted for painting, plus any items not listed in paragraph 1.2.B, and any items factory primed for field painting, and surface preparation and priming.
 5. Work includes field painting of new exterior exposed bare and covered pipes and ducts, and of hangers, exposed steel and iron work, and primed metal surfaces of equipment in exposed areas installed under mechanical and electrical work, except as otherwise indicated.
 6. All surfaces not included in the list set forth below, Paragraph 1.2.B, whether specifically listed under Articles 3.04 and 3.05 below or not, shall be painted and/or stained as directed by the Architect/Owner, using same paint/stain as similar adjacent materials or areas.
- B. No finish required on the following: Unless specifically specified otherwise, the following surfaces or categories of work are not included as part of field-applied finish work of this section.
1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) exterior masonry, glass sealant (excluding caulking as specified herein), and finished mechanical and electrical equipment.
 2. Exposed Finish Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel chromium plate, copper, brass, bronze and similar finished materials will not require finish painting.
 3. Operating Parts: Do not paint moving parts of operating units such as valves, damper operators, sensing devices, linkage, motor and fan shafts, and similar unless otherwise indicated.
 4. Code-Required Labels: Do not paint over code-required labels, such as fire rated labels on doors and frames.
 5. Exterior Fabrications consisting of:
 - a. Galvanized Steel Vehicular Gates.
 - b. Galvanized Fall Arrest Anchors.

- c. Galvanized Steel Access Ladders.
- d. Galvanized Steel Pipe Railings and Handrails
- e. Galvanized Structural Steel Members at the Rooftop Mechanical Equipment Screen.
- f. Galvanized Structural Steel Members at the Rooftop Chiller Support Platform
- g. Galvanized Steel Chain Link Gates & Fences.

C. Colors:

- 1. Selected by the Architect from samples and textures prepared on the work by the Contractor.
- 2. Not more than 2 different paint and enamel colors will be required for exterior work, excluding doors and frames. Not more than 2 different colors will be required for exterior doors and frames.
- 3. Deep Tone Hues: For bidding purposes, assume 100% deep tone hues for exterior.
- 4. Where directed by the Architect, the Contractor shall provide custom colors to match Architect's samples, or as required to achieve the color desired by the Architect.

D. Key Abbreviations include the following:

- 1. PF Paint Finish

E. Related Requirements:

- 1. Section 321216 "Asphalt Paving" for traffic-marking paint.
- 2. Section 051200 "Structural Steel" for shop priming structural steel.
- 3. Section 055000 "Metal Fabrications" for shop priming ferrous metal.
- 4. Section 079200 "Joint Sealants" for sealant requirements.
- 5. Section 081113 "Hollow Metal Doors & Frames" for shop priming steel doors and frames.
- 6. Section 099123 "Interior Painting" for requirements for interior painting.

1.3 QUALITY ASSURANCE

A. References:

- 1. Except as hereinafter specified, for materials and workmanship, conform to the "Architectural Painting Specification Manual" as published by the Master Painters Institute, hereinafter referred to as "MPI", as published by:
 - a. International: Master Painters Institute, 972-702-3000, <http://mpi.net/>
- 2. Consult Manual for surfaces not specifically mentioned in this Section.
- 3. Conform to above Manual's entire standards for "Premium Grade" materials and work, except as otherwise indicated. Consult Manual for surfaces not specifically mentioned in this Section.

B. Pre-Installation Conference: Conduct conference at project site.

- 1. Before installing work of this section, schedule and attend a pre-installation meeting in conformance with Division 01 Section "Project Meetings". Attendees at this conference shall include the General Contractor, Painting Contractor, Painting Inspector, Owners Representative, and Architect.

- C. Field Samples and Mockup: The Contractor shall prepare and paint a minimum of 100 square feet of surface, including a door and frame. On wall surfaces and other exterior components, duplicating finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until the required sheen, color, and texture are obtained; simulate finished lighting conditions for reviewing in place work.
1. Indicated the number of paint coats installed by not coating the entire surface.
 2. Completed mock-up may be incorporated into the work and will be used as a basis to evaluate subsequent work.
 3. Final acceptance of colors will be from job-applied samples.
 4. The Architect will select one area, or surface to represent surfaces and conditions for each type of coating and substrate to be coated. Apply coatings in this area, or surface according to the schedule, or as specified. After finishes are accepted, this area or surface will be used for evaluation of coating systems of a similar nature.
- D. Inspection
1. Work in this Section may be inspected and tested by an independent inspection agency at the Owner's expense. Notify inspection agency at least ten (10) full working days prior to starting work under this Section. Allow full access to the work and give full cooperation at all times with inspection agency in the performance of their duties of inspecting and testing the work. Painting contractor shall repair all destructive testing sites.
 2. All inspection and testing fees for work of this Section shall be paid for by the Owner. The Contractor, shall, however, make all arrangements with the testing agency and notify them of award of contract, the amounts of the contract, and the commencement of work.
- E. Requirements of Regulatory Agencies
1. Occupational Safety & Health and Pollution Regulations: Conform to the Federal and State requirements for painting work applicable to this project.
 2. Permits: Obtain and pay for any special permits required by local governmental agencies.
 3. Codes: Conform to any special local code requirements applicable to work of this Section.
- F. Qualifications
1. Manufacturer & Materials: Unless specifically specified otherwise, use only the approved products of the paint manufacturers listed in the MPI.
 2. Application – General: The firm engaged for work under this Section shall, upon request, furnish in writing his qualifications attesting to past satisfactory experience in painting work of not less than the scope of this Project.
 - a. Maintain a crew of painters throughout duration of the painting work who shall be qualified to fully satisfy the requirements of these Specifications. A qualified foreman will be on site during preparation and painting operations.
 - b. Employ only qualified journeymen, in this painting work; apprentices may be employed on the project to work under the direction of qualified journeymen in accordance with trade regulations.
 - c. Conform to manufacturer's specifications, directions and recommendations for best results in use for each condition. Should they be at variance with these specifications, report discrepancy to Architect for clarification.

- G. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer and use only within recommended limits.
- H. Paint Coordination
 - 1. Provide finish coats which are compatible with prime paints used.
 - 2. Review other sections of these specification in which prime paints are to be provided to ensure compatibility of total coating system for various substrates.
 - 3. Upon request from other trades, furnish information on characteristics of specified finish materials provided for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including paint label analysis and application instruction for each material proposed for use.
- B. Samples
 - 1. Applied Finish Samples: Upon transmittal of color schedule to Contractor, submit samples in accordance with the following as directed:
 - a. Prepare (4) sets of 8 ½ x 11" paint sample cards of each color, texture, and sheen.
 - b. Furnish additional required samples until colors, finishes, textures are reviewed and accepted by the Architect.
 - c. Mark on each sample, the paint manufacturer's name, color name, color code formula, and general location/designation.
 - d. Allow ample time for the selection of colors; do not begin work until colors are approved.
- C. Materials List
 - 1. Submit complete and detailed list of materials proposed for use on the work.
 - 2. Include manufacturer's names and color-code numbers.
 - 3. Obtain Architect's review of materials before ordering.
- D. Manufacturers' Specifications, Directions and Recommendations.
- E. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery and Storage of Material:
 - 1. Deliver materials to job site in unbroken sealed packages with manufacturer's original labels thereon, bearing manufacturer's name, type of paint, brand name, color designation and instruction for mixing and/or reducing.

2. Store and mix material outside building; store per manufacturer's recommendations and as required by governing Codes and Ordinances.
3. Take all necessary precautionary measures to prevent fire hazards and spontaneous combustion; place cotton waste, cloths, and other hazardous materials in containers, and daily remove from site.
4. Toxic, acetic, and explosive materials: Take regular appropriate safety precautions conforming to manufacturer's recommendations and applicable "Regulatory Requirements".

1.6 JOB CONDITIONS

A. Conditions of Surfaces

1. Put surfaces in proper condition for application of finishes.
2. Do no outside work during damp or freezing weather, or until surfaces have thoroughly dried from the effects of such weather.
3. Do not work when dust or insects are present.
4. Furnish lights in area of work. 60 candle power minimum.

B. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

C. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

D. Protection of Finished Work

1. Use tarpaulins or drop cloths and masking tape and paper when working above or adjacent to finished work.
2. Clean paint spatter and stains from finished surfaces.

E. Defective Finishing Work

1. This trade responsible for improper workmanship or misuse of finishing materials; refinish at the expense of this trade and leave in first-class condition, as approved by Architect.
2. Surfaces damaged by other trades after painting and decorating is completed shall be the responsibility of the trade causing such damage; refinishing shall be at the expense of the person or trade causing damage.
3. Refinish to condition approved by Architect, at no additional expense to Owner.

1.7 WARRANTY

A. Warranty

1. Upon verification of Substantial Completion or Inspection showing that work has been completed and is in compliance with the Contract Documents and the MPI, furnish an installer's warranty against failure and non-performance, for two-years from date of Final Completion of the Project.
2. Immediately prior to the end of the two-year warranty period, the Owner may furnish inspection services and a written report for failed coatings that have resulted from materials or workmanship.

- a. Warrant work to be in accordance with Specifications and referenced standards.
- b. Warranty not applicable to defective items through faulty work by other trades, or for failure of substrate.
- c. Warranty does not assume any liability for claims other than repairing painting and finishing defects.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Benjamin Moore & Co.
2. Miller Paints
3. Rodda
4. Sherwin-Williams
5. Tnemec

2.2 PAINT, GENERAL

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

- B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

- C. Material Quality

1. Provide the best quality grade of the various types of coatings as regularly manufactured by approved paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Provide paints of durable and washable quality.

- D. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Dry-Fog Coatings: 150 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Rust-Preventive Coatings: 100 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.

E. Colors and Finishes

1. Prior to beginning work, Architect will select colors for surfaces to be painted or stained, as selected from full line of colors furnished by paint manufacturer, or custom colors. Match the selected colors and submit samples, as specified herein, before proceeding with the work.
2. Final acceptance of colors will be from samples applied on the job.

F. Caulking Compound: Furnish paintable white caulking compound as specified in Section 079200 "Joint Sealants".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection of Surfaces

1. Applicator shall examine area and conditions under which painting work is to be applied and notify Contractor and Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to applicator, and surfaces approved by Architect. Conform to the MPI manual as to surface conditions and preparation for each various surface to be painted or finished.
2. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or foreign material.

B. Field Quality Control

1. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting;
 - a. Request product invoice from single source manufacturer of products delivered to site showing the product that is being used on this project is that which was specified in the contract documents.
 - b. Engage services of an independent testing agency and/or laboratory, separate from the inspection service retained by the Contractor (if applicable) to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
 - c. Testing agency and/or laboratory will perform appropriate tests for any or all of the following characteristics; abrasion resistance, apparent reflectivity, flexibility, wash ability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis, and provide thickness test.
2. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non complying paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible, and pay for re-testing to confirm compliance.

3.2 PREPARATION

A. Surface Conditions

1. Before Starting Work of This Section: Do not proceed until any discovered defects have been corrected and surfaces are approved as ready to receive the work under this Section.
2. Upon Starting Work:
 - a. Conform to Field Quality Control requirements specified hereinafter.
 - b. Starting work under this Section constitutes acceptance of surfaces by painter.
 - c. Unless otherwise specified, surfaces considered the responsibility of other trades for work under this Section include:
 - 1) Shop prime coats (if any) of structural steel, miscellaneous metal, sheet metal, and other shop prime coated metal items except for minimal spot touch-up painting at field welds and surfaces abraded during their installation.
 - 2) The condition of substrates to be painted or finished under this Section, which may adversely affect the painting work.
 - 3) If substrate in Contractor's opinion is not up to industry standards, advise Architect and General Contractor in writing.

B. Surface Preparation – New Work

1. General
 - a. Prepare surfaces to receive scheduled work under this Section as hereinafter set forth and as supplemented by the MPI, for surface preparation work for surfaces not noted herein.
 - b. Before applying paint or other finish, remove hardware, accessories, plates, factory-finished mechanical work, lighting fixtures, and similar items, replace upon completion.
 - c. Use only skilled mechanics for removing and reinstalling above items.
2. For Mildew Removal; Scrub with a Jomax Mildew Cleaner solution, bleaching solution, then rinse with potable water and let thoroughly dry.
3. Structural and Miscellaneous Steel, Iron and Sheet Metal, including Steel Joists and Metal Deck: Put in proper condition to receive paint. Grease, rust, scale, dirt and dust are required to be removed by other trades except as otherwise noted. Use only prime paints compatible with finish coats. Review other sections to see that surface preparation is covered.
 - a. Surfaces shop primed by others:
 - 1) At field welded or abraded spots, apply a phosphoric acid etch solution. Let set as recommended by acid etch manufacturer. Rinse with potable water. When thoroughly dry, immediately apply prime coat.
 - 2) Clean previously primed surfaces free of any remaining oil and grease per SSPC-SP-1.
 - b. Surfaces not previously shop primed:

- 1) Remove rust, scale, dirt and other foreign material per SSPC SP-3.
 - 2) Apply phosphoric acid etch manufacturer. Rinse with potable water. When thoroughly dry, immediately apply prime coat. Any defects showing in prime surface are required to be repaired by other trades. Re-prime over repaired defects.
4. Metal Doors and Their Frames and Relite Frames: Prepare surfaces including tops, bottom and side surfaces normally concealed from view by sanding. Solvent wipe per SSPC-SP-1. All exposed surfaces, including but not limited to the face, throat, edges and stops (all sides), shall be finished as specified in this section. Coordinate with Division 8 "Glazing" to glaze frames after painting.
 5. Galvanized Iron and Field Welded Pipe: Remove surface contamination in accordance with SSPC-SP3, power tool cleaning. Treat welds with phosphoric acid and prime. Also coordinate with applicable Division 5 Sections.
 6. Mechanical and Electrical Work: Prepare metal surfaces as specified for miscellaneous steel and iron, and non-ferrous metal as applicable to type of material scheduled to be painted. Remove dirt, grease and oil and other foreign material from surfaces to be painted per SSPC-SP-2. Sand glossy surfaces.
 7. Concrete Substrates: Power tool clean substrates per SSPC-SP-3 power tool cleaning to remove loose material, concrete fines and slurry.

C. Materials Preparation

1. Mix and prepare painting materials in accordance with manufacturer's directions. Do not mix together paints of different sheen's and manufacturers.
2. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
3. Stir materials before application to produce a mixture of uniform density and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and, if necessary, strain the material before using.

3.3 APPLICATION OF PAINT AND FINISH

A. Workmanship, General:

1. Highest quality consistent with trade practice, performed by skilled mechanics.
2. Apply paint and finish materials by method at painter's option. Spray apply finish coat on exposed steel; spread material evenly with uniform gloss and finish and without runs or sags. Final coat on hollow metal frames and doors shall be applied with a short knap roller.
3. Vary color of successive coats to prevent skipping.
4. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance.
5. Cut sharp lines against glass, other materials, and different color.
6. Allow ample time between coats for thorough drying, not less than manufacturer's recommended minimum time.
7. Paint access panels, and removable or hinged covers to match the exposed surfaces.
8. Exterior prime and finish coats shall not be applied when air temperature is below plus 45 degrees F.
9. Apply block fillers to be pinhole free.

- B. Finish Film Thickness: Apply primer, intermediate, and finish coats to not less than wet and dry film thickness and spreading rate as recommended by product manufacturer for each of the various types of specified materials, unless otherwise specified herein.
- C. Cleaning: As the work proceeds, and on its completion, promptly remove all spilled, splashed or splattered paint. Remove in such a manner as not to damage surfaces. Thoroughly clean paint and splatter from glass, mirrors, and other such surfaces. Take care not to scratch surfaces.
 - 1. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris resulting from the work in this Section.
 - 2. At work's conclusion, leave premises neat and clean.
- D. Protection
 - 1. Protect surrounding areas and surfaces to preclude damage during work of this Section.
 - 2. Make good any damage caused by failure to provide suitable protection, but not any damage caused by other trades.
 - 3. Removal of Hardware and Miscellaneous Items:
 - a. Remove escutcheons, surface hardware, fittings, fastenings, and the like prior to starting work.
 - b. Carefully store, clean and reinstall these items on completion of work in each area. Do not use cleaning agents detrimental to permanent lacquer finishes.

3.4 EXTERIOR PAINTING AND FINISHING SCHEDULE

- A. General: Work specified herein is in ADDITION to shop coats called for under other Sections. All paint systems must conform to the MPI manual. If a paint system herein does not comply with the MPI, contact the Architect for clarification.
 - 1. Ferrous Metal: Exposed Structural Steel, Canopy Supports, and Miscellaneous Metal Fabrications except as otherwise scheduled.
Ext 5.1L, Polyurethane, Pigmented, Premium Grade
 - Inorganic Zinc Primer (touch up shop coat) Prod. 19
 - High Build Epoxy Prod. 98
 - Polyurethane (Gloss) Prod. 72 – G5 (semi-gloss)
 - 2. Ferrous Metal: Hollow Metal Doors and Frames
Ext 5.1D, Alkyd, Premium Grade
 - Alkyd Metal Primer (touch up shop coat) Prod. 79
 - Alkyd Prod. 9
 - Alkyd (Gloss) Prod. 9 – G6 (gloss)
 - 3. Plastic: PVC Downspouts
Ext. 68C, Proprietary - Light Industrial
 - Exterior Primer Prod. 17
 - Exterior Acrylic Enamel Prod. 110 – G6 (gloss)
 - Exterior Acrylic Enamel Prod. 110 – G6 (gloss)

END OF SECTION 099113

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 surface preparation and field painting of the following:
 - 1. Interior Painting:
 - a. Paint all new materials unless otherwise noted.
 - 2. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as primer, intermediate or finish coats.
 - 3. Priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
 - 4. Work includes painting and finishing of all interior items and surfaces scheduled for painting, plus any items not listed in paragraph 1.2.B, and any items factory primed for field painting and surface preparation and priming.
 - 5. Work includes field painting of new interior exposed bare and covered pipes and ducts, and of hangers, exposed steel and iron work such as structural steel framing, joists, underside of roof deck, miscellaneous metals, and primed metal surfaces of equipment in exposed areas installed under mechanical and electrical work, except as otherwise indicated.
 - 6. All surfaces not included in the list set forth below, Paragraph 1.2.B, whether specifically listed under Articles 3.04 and 3.05 below or not, shall be painted and/or stained as directed by the Architect/Owner, using same paint/stain as similar adjacent materials or areas.
- B. No finish required on the following: Unless specifically specified otherwise, the following surfaces or categories of work are not included as part of field-applied finish work of this section.
 - 1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) interior masonry, toilet partitions and screens, acoustic materials, custom casework, plastic laminate surfaced wood and plywood, glass sealant (excluding caulking as specified herein), ceramic tile, floor coverings, elevator equipment, and finished mechanical and electrical equipment including luminous ceilings, lighting fixtures, switch gear and distribution panels.
 - 2. Exposed Finish Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel chromium plate, copper, brass, bronze and similar finished materials will not require finish painting.
 - 3. Concealed Surfaces, including walls and ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.

- c. Ceiling plenums.
 - d. Pipe spaces.
 - e. Duct shafts.
 - f. Concealed Attics.
 - 4. Specific Rooms: The following rooms do not require painting:
 - a. Mechanical Basement 001, Plenum 002, Electrical 126, MDF 128, Equipment Platform 301.
 - 5. Operating Parts: Do not paint moving parts of operating units such as valves, damper operators, sensing devices, linkage, motor and fan shafts, and similar unless otherwise indicated.
 - 6. Code-Required Labels: Do not paint over code-required labels, such as fire rated labels on doors and frames.
- C. Colors:
- 1. Selected by the Architect from samples and textures prepared on the work by the Contractor.
 - 2. Not more than 8 different paint and enamel colors will be required for interior work, excluding doors and frames. Not more than 4 different colors will be required for interior doors and frames.
 - 3. Deep Tone Hues: For bidding purposes, assume interior deep tone hues will not be in excess of 10%.
 - 4. Where directed by the Architect, the Contractor shall provide custom colors to match Architect's samples, or as required to achieve the color desired by the Architect.
- D. Key Abbreviations include the following:
- 1. PF Paint Finish
- E. Related Requirements:
- 1. Section 051200 "Structural Steel" for shop priming structural steel.
 - 2. Section 055000 "Metal Fabrications" for shop priming ferrous metal.
 - 3. Section 079200 "Joint Sealants" for sealant requirements.
 - 4. Section 081416 "Flush Wood Doors" for factory preparation and factory finishing as specified.
 - 5. Section 081113 "Hollow Metal Doors & Frames" for shop priming steel doors and frames.
 - 6. Section 092900 "Gypsum Board" for surface preparation for gypsum board.
 - 7. Section 099113 "Exterior Painting" for requirements for exterior painting.

1.3 QUALITY ASSURANCE

A. References:

- 1. Except as hereinafter specified, for materials and workmanship, conform to the "Architectural Painting Specification Manual" as published by the Master Painters Institute, hereinafter referred to as "MPI", as published by:
 - a. International: Master Painters Institute, 972-702-3000, <http://mpi.net/>

2. Consult Manual for surfaces not specifically mentioned in this Section.
 3. Conform to above Manual's entire standards for "Premium Grade" materials and work, except as otherwise indicated. Consult Manual for surfaces not specifically mentioned in this Section.
- B. Pre-Installation Conference: Conduct conference at project site.
1. Before installing work of this section, schedule and attend a pre-installation meeting in conformance with Division 01 Section "Project Meetings". Attendees at this conference shall include the General Contractor, Painting Contractor, Painting Inspector, Owners Representative, and Architect.
- C. Field Samples and Mockup: The Contractor shall prepare and paint a minimum of 100 square feet of surface, including a door and frame. On wall surfaces and other interior components, duplicating finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until the required sheen, color, and texture are obtained; simulate finished lighting conditions for reviewing in place work.
1. Indicated the number of paint coats installed by not coating the entire surface.
 2. Completed mock-up may be incorporated into the work, and will be used as a basis to evaluate subsequent work.
 3. Final acceptance of colors will be from job-applied samples.
 4. The Architect will select one room, area, or surface to represent surfaces and conditions for each type of coating and substrate to be coated. Apply coatings in this room, area, or surface according to the schedule, or as specified. After finishes are accepted, this room, area or surface will be used for evaluation of coating systems of a similar nature.
- D. Inspection
1. Work in this Section will be inspected and tested by an independent inspection agency at the Owner's expense. Notify inspection agency at least ten (10) full working days prior to starting work under this Section. Allow full access to the work and give full cooperation at all times with inspection agency in the performance of their duties of inspecting and testing the work. Painting contractor shall repair all destructive testing sites.
 2. All inspection and testing fees for work of this Section shall be paid for by the Owner. The Contractor, shall, however, make all arrangements with the testing agency and notify them of award of contract, the amounts of the contract, and the commencement of work.
- E. Requirements of Regulatory Agencies
1. Occupational Safety & Health and Pollution Regulations: Conform to the Federal and State requirements for painting work applicable to this project.
 2. Permits: Obtain and pay for any special permits required by local governmental agencies.
 3. Codes: Conform to any special local code requirements applicable to work of this Section.
- F. Qualifications
1. Manufacturer & Materials: Unless specifically specified otherwise, use only the approved products of the paint manufacturers listed in the MPI.

2. Application – General: The firm engaged for work under this Section shall, upon request, furnish in writing his qualifications attesting to past satisfactory experience in painting work of not less than the scope of this Project.
 - a. Maintain a crew of painters throughout duration of the painting work who shall be qualified to fully satisfy the requirements of these Specifications. A qualified foreman will be on site during preparation and painting operations.
 - b. Employ only qualified journeymen, in this painting work; apprentices may be employed on the project to work under the direction of qualified journeymen in accordance with trade regulations.
 - c. Conform to manufacturer's specifications, directions and recommendations for best results in use for each condition. Should they be at variance with these specifications, report discrepancy to Architect for clarification.

G. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer and use only within recommended limits.

H. Paint Coordination

1. Provide finish coats which are compatible with prime paints used.
2. Review other sections of these specification in which prime paints are to be provided to ensure compatibility of total coating system for various substrates.
3. Upon request from other trades, furnish information on characteristics of specified finish materials provided for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical information including paint label analysis and application instruction for each material proposed for use.

B. Samples

1. Applied Finish Samples: Upon transmittal of color schedule to Contractor, submit samples in accordance with the following as directed:
 - a. Prepare (4) sets of 8 ½ x 11" paint sample cards of each color, texture, and sheen.
 - b. Three samples each lumber species, each 2 feet long, for "stain samples".
 - c. Furnish additional required samples until colors, finishes, textures are reviewed and accepted by the Architect.
 - d. Mark on each sample, the paint manufacturer's name, color name, color code formula, and general location/designation.
 - e. Allow ample time for the selection of colors; do not begin work until colors are approved.

C. Materials List

1. Submit complete and detailed list of materials proposed for use on the work.
2. Include manufacturer's names and color-code numbers.
3. Obtain Architect's review of materials before ordering.

- D. Manufacturers' Specifications, Directions and Recommendations.
- E. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery and Storage of Material:
 - 1. Deliver materials to job site in unbroken sealed packages with manufacturer's original labels thereon, bearing manufacturer's name, type of paint, brand name, color designation and instruction for mixing and/or reducing.
 - 2. Store and mix material outside building; store per manufacturer's recommendations and as required by governing Codes and Ordinances.
 - 3. Take all necessary precautionary measures to prevent fire hazards and spontaneous combustion; place cotton waste, cloths, and other hazardous materials in containers, and daily remove from site.
 - 4. Toxic, acetic, and explosive materials: Take regular appropriate safety precautions conforming to manufacturer's recommendations and applicable "Regulatory Requirements".

1.6 JOB CONDITIONS

- A. Conditions of Surfaces
 - 1. Put surfaces in proper condition for application of finishes.
 - 2. See that proper temperatures are maintained for inside work.
 - 3. Do not work when dust or insects are present.
 - 4. Furnish lights in area of work. 60 candle power minimum.
- B. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- C. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- D. Protection of Finished Work
 - 1. Use tarpaulins or drop cloths and masking tape and paper when working above or adjacent to finished work.
 - 2. Clean paint spatter and stains from finished surfaces.
- E. Defective Finishing Work
 - 1. This trade responsible for improper workmanship or misuse of finishing materials; refinish at the expense of this trade and leave in first-class condition, as approved by Architect.
 - 2. Surfaces damaged by other trades after painting and decorating is completed shall be the responsibility of the trade causing such damage; refinishing shall be at the expense of the person or trade causing damage.
 - 3. Refinish to condition approved by Architect, at no additional expense to Owner.

1.7 WARRANTY

A. Warranty

1. Upon verification of Substantial Completion or Inspection showing that work has been completed and is in compliance with the Contract Documents and the MPI, furnish an installer's warranty against failure and non-performance, for two-years from date of Final Completion of the Project.
2. Immediately prior to the end of the two-year warranty period, the Owner may furnish inspection services and a written report for failed coatings that have resulted from materials or workmanship.
 - a. Warrant work to be in accordance with Specifications and referenced standards.
 - b. Warranty not applicable to defective items through faulty work by other trades, or for failure of substrate.
 - c. Warranty does not assume any liability for claims other than repairing painting and finishing defects.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Benjamin Moore & Co.
2. Miller Paints
3. Rodda
4. Sherwin-Williams
5. Tnemec

2.2 PAINT, GENERAL

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

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

C. Material Quality

1. Provide the best quality grade of the various types of coatings as regularly manufactured by approved paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Provide paints of durable and washable quality.

- D. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Flat Paints and Coatings: 50 g/L.
 2. Non-flat Paints and Coatings: 50 g/L.
 3. Dry-Fog Coatings: 150 g/L.
 4. Primers, Sealers, and Undercoaters: 100 g/L.
 5. Rust-Preventive Coatings: 100 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Shellacs, Clear: 730 g/L.
 9. Shellacs, Pigmented: 550 g/L.
- E. Colors and Finishes
1. Prior to beginning work, Architect will select colors for surfaces to be painted or stained, as selected from full line of colors furnished by paint manufacturer, or custom colors. Match the selected colors and submit samples, as specified herein, before proceeding with the work.
 2. Final acceptance of colors will be from samples applied on the job.
- F. Caulking Compound: Furnish paintable white caulking compound as specified in Section 079200 "Joint Sealants".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspection of Surfaces
1. Applicator shall examine area and conditions under which painting work is to be applied and notify Contractor and Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to applicator, and surfaces approved by Architect. Conform to the MPI manual as to surface conditions and preparation for each various surface to be painted or finished.
 2. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
 3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or foreign material.
- B. Field Quality Control
1. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting;
 - a. Request product invoice from single source manufacturer of products delivered to site showing the product that is being used on this project is that which was specified in the contract documents.
 - b. Engage services of an independent testing agency and/or laboratory, separate from the inspection service retained by the Contractor (if applicable) to sample

paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.

- c. Testing agency and/or laboratory will perform appropriate tests for any or all of the following characteristics; abrasion resistance, apparent reflectivity, flexibility, wash ability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis, and provide thickness test.
2. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non complying paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible, and pay for re-testing to confirm compliance.

3.2 PREPARATION

A. Surface Conditions

1. Before Starting Work of This Section: Do not proceed until any discovered defects have been corrected and surfaces are approved as ready to receive the work under this Section.
2. Upon Starting Work:
 - a. Conform to Field Quality Control requirements specified hereinafter.
 - b. Starting work under this Section constitutes acceptance of surfaces by painter.
 - c. Unless otherwise specified, surfaces considered the responsibility of other trades for work under this Section include:
 - 1) Shop prime coats (if any) of structural steel, miscellaneous metal, sheet metal, and other shop prime coated metal items except for minimal spot touch-up painting at field welds and surfaces abraded during their installation.
 - 2) Gypsum wallboard finishing of joints, moldings and fastenings.
 - 3) The condition of substrates to be painted or finished under this Section, which may adversely affect the painting work.
 - 4) If substrate in Contractor's opinion is not up to industry standards, advise Architect and General Contractor in writing.

B. Surface Preparation – New Work

1. General
 - a. Prepare surfaces to receive scheduled work under this Section as hereinafter set forth and as supplemented by the MPI, for surface preparation work for surfaces not noted herein.
 - b. Before applying paint or other finish, remove hardware, accessories, plates, factory-finished mechanical work, lighting fixtures, and similar items, replace upon completion.
 - c. Use only skilled mechanics for removing and reinstalling above items.
2. For Mildew Removal; Scrub with a Jomax Mildew Cleaner solution, bleaching solution, then rinse with potable water and let thoroughly dry.
3. Wood Products:

- a. Test surfaces with moisture meter to assure that moisture content does not exceed (12%) 12 percent.
 - b. Sandpaper smooth, except where rough surface is used for the finish surface; dust off.
 - c. After prime or stain coat has been applied, fill holes and cracks with putty or plastic wood; for natural and stain finish, color putty to match stained wood.
 - d. For surface to be oiled or painted, remove dirt and contamination. Sand then wipe off all dust and grit prior to oiling or painting; if surface is to be painted, sand between coats.
 - e. Turn over to carpenters an adequate quantity of stain that they may apply one brush coat of stain to job site cut ends and edges as installation proceeds.
4. Structural and Miscellaneous Steel, Iron and Sheet Metal, including Steel Joists and Metal Deck: Put in proper condition to receive paint. Grease, rust, scale, dirt and dust are required to be removed by other trades except as otherwise noted. Review other sections to see that surface preparation is covered.
 - a. Surfaces shop primed by others:
 - 1) At field welded or abraded spots, apply a phosphoric acid etch solution. Let set as recommended by acid etch manufacturer. Rinse with potable water. When thoroughly dry, immediately apply prime coat.
 - 2) Clean previously primed surfaces free of any remaining oil and grease per SSPC-SP-1.
 - b. Surfaces not previously shop primed:
 - 1) Remove rust, scale, dirt and other foreign material per SSPC SP-3.
 - 2) Apply phosphoric acid etch manufacturer. Rinse with potable water. When thoroughly dry, immediately apply prime coat. Any defects showing in prime surface are required to be repaired by other trades. Re-prime over repaired defects.
5. Metal Doors and Their Frames and Relite Frames: Prepare surfaces including tops, bottom and side surfaces normally concealed from view by sanding. Solvent wipe per SSPC-SP-1. All exposed surfaces, including but not limited to the face, throat, edges and stops (all sides), shall be finished as specified in this section. Coordinate with Division 8 "Glazing" to glaze frames after painting.
6. Galvanized Iron and Field Welded Pipe: Remove surface contamination in accordance with SSPC-SP3, power tool cleaning. Treat welds with phosphoric acid and prime. Also coordinate with applicable Division 5 Sections.
7. Gypsum Wallboard:
 - a. Surfaces are to be crack-free, properly finished and left clean by other trades.
 - b. Remove any minor subsequent contamination, dust marks, and dirt.
 - c. If surface defects appear after prime coating, have defects repaired by and as the expense of the drywall trade; after defects are corrected, proceed with finish painting again using primer over required area.
8. Mechanical and Electrical Work: Prepare metal surfaces as specified for miscellaneous steel and iron, and non-ferrous metal as applicable to type of material scheduled to be

painted. Remove dirt, grease and oil and other foreign material from surfaces to be painted per SSPC-SP-2. Sand glossy surfaces.

9. Concrete Substrates: Power tool clean substrates per SSPC-SP-3 power tool cleaning to remove loose material, concrete fines and slurry.

C. Materials Preparation

1. Mix and prepare painting materials in accordance with manufacturer's directions. Do not mix together paints of different sheen's and manufacturers.
2. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
3. Stir materials before application to produce a mixture of uniform density and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and, if necessary, strain the material before using.

3.3 APPLICATION OF PAINT AND FINISH

A. Workmanship, General:

1. Highest quality consistent with trade practice, performed by skilled mechanics.
2. Sand interior surfaces between coats.
3. Apply paint and finish materials by method at painter's option, except as follows:
 - a. Exposed steel: Spray apply finish coat on exposed steel; spread material evenly with uniform gloss and finish and without runs or sags.
 - b. Final coat on hollow metal frames and doors shall be applied with a short knap roller.
4. Vary color of successive coats to prevent skipping.
5. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance.
6. Cut sharp lines against glass, other materials, and different color.
7. Allow ample time between coats for thorough drying, not less than manufacturer's recommended minimum time.
8. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment of furniture with prime coat only.
9. Paint access panels, and removable or hinged covers to match the exposed surfaces.

B. Priming and Back Priming Interior Wood Products:

1. For Surfaces to Receive Paint or Enamel Finish: Before installation by other trades prime and back prime interior finish wood products. Use interior wood prime paint. All primed areas to be fine sanded. All nail and screw holes to be filled, and all caulking completed prior to painting or staining.
2. For Surfaces to Receive Clear or Transparent Stain Finish: Interior finish lumber, trim and millwork (stain and lacquer finish).
 - a. For surfaces not normally exposed, back prime with alkyd-based primer/sealer prior to installation by other trades.

- b. Apply first coat of stain and filler specified to exposed faces, edges and ends prior to installation by other trades.
- C. Filling Open-Grain Wood Product Surfaces: Fill open-grain wood product surfaces to reflect grain contours as acceptable and sand.
- D. Finish Film Thickness: Apply primer, intermediate, and finish coats to not less than wet and dry film thickness and spreading rate as recommended by product manufacturer for each of the various types of specified materials, unless otherwise specified herein.
- E. Cleaning: As the work proceeds, and on its completion, promptly remove all spilled, splashed or splattered paint. Remove in such a manner as not to damage surfaces. Thoroughly clean paint and splatter from glass, mirrors, and other such surfaces. Take care not to scratch surfaces.
 - 1. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris resulting from the work in this Section.
 - 2. At work's conclusion, leave premises neat and clean.
- F. Protection
 - 1. Protect surrounding areas and surfaces to preclude damage during work of this Section.
 - 2. Make good any damage caused by failure to provide suitable protection, but not any damage caused by other trades.
 - 3. Removal of Hardware and Miscellaneous Items:
 - a. Remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings, fastenings, and the like prior to starting work.
 - b. Carefully store, clean and reinstall these items on completion of work in each area. Do not use cleaning agents detrimental to permanent lacquer finishes.

3.4 INTERIOR PAINTING AND FINISHING SCHEDULE

- A. General
 - 1. Work specified herein is in ADDITION to shop coats called for under various other Divisions and Sections.
 - 2. Unless otherwise specifically noted on Drawings, or set forth hereinafter, all interior surfaces shall be painted, or enameled and/or finished in accordance with the number and type of coats as hereinafter specified.
- B. Mechanical and Electrical Equipment
 - 1. Ductwork: No painting required in Electrical Rooms and mechanical spaces. At all other locations, paint exposed ductwork, including hangers and supports, in areas with finish-painted walls and ceiling. Color as selected by Architect.
 - 2. Conduit: No painting required in Electrical Rooms and mechanical spaces. At all other locations, paint exposed conduit, including hangers and supports, in areas with finish-painted walls and ceiling of same finish color as adjacent wall and/or ceiling, as applicable.
- C. Gypsum Board (GB)

Int. 9.2B, High Performance Architectural Latex, Premium Grade
Latex Primer Sealer Prod. 50
HIPAC Latex Prod. 140
HIPAC Latex (Satin) Prod. 140 – G4

D. MDF Trim, MDF Wainscot, MDF Paneling (MDFP):

Int. 6.3K, Premium Grade
Polyurethane Varnish Prod. 57
Polyurethane Varnish Prod. 57 – G4
Polyurethane Varnish Prod. 57 – G4

E. Plywood Backing Panels (PWBP)

Int. 6.4A, Latex Finish over Primer
Alkyd Primer Prod. 45
Latex Paint (Satin) Prod. 53 – G4

F. Hardwood Trim and Base (HWDT), (HWDB), and all exposed wood materials except as otherwise scheduled.

Int. 6.3K, Polyurethane Varnish, Premium Grade
Polyurethane Varnish Prod. 57
Polyurethane Varnish Prod. 57
Polyurethane Varnish (Satin) Prod. 57 – G4

G. Exposed Ferrous Metal: Structural Steel, Steel Joists, Hollow Metal Doors and Frames, Miscellaneous Metal Fabrications, Guardrails, Sprinkler Pipes, and other exposed primed metals.

Int. 5.1E, Alkyd, Premium Grade
Alkyd Metal Primer (touch up shop coat) Prod. 79
Alkyd Prod. 48
Alkyd (Gloss) Prod. 48 – G6

H. Galvanized Metal: Mechanical Ductwork, Electrical Conduit, Steel Roof deck and all other exposed galvanized metals

Int. 5.3C, Alkyd (over cementitious primer), Premium Grade
Cementitious Primer Prod. 26
Alkyd Prod. 48

END OF SECTION 099123

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. Porcelain Enamel Steel Markerboards.
 - 2. Porcelain Enamel Marker Walls.
 - 3. Field-Assembled Trim for Marker Walls.
- B. Key Abbreviations include the following:
 - 1. MB Markerboard
 - 2. MBW Markerboard Walls

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
- B. Sustainable Design Submittals:
 - 1. Product Data: For installation adhesives, indicating VOC content.
 - 2. Product Data: For composite wood products, indicating compliance with requirements for formaldehyde emissions.
- C. Shop Drawings: For visual display units.
 - 1. Include plans, elevations, sections, details, and attachment to other work.
 - 2. Show locations of panel joints.
 - 3. Show locations and layout of special-purpose graphics.
 - 4. Include sections of typical trim members.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of tackboards.
- B. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For visual display units to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units, including factory applied trim, completely assembled in one piece, without joints, where possible. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with visual display units by field measurements before fabrication.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.9 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 - 2. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of visual display unit from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. 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: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.3 VISUAL DISPLAY BOARD ASSEMBLY (MB)

- A. Basis of Design Product: Subject to compliance with requirements, provide Claridge Products and Equipment, Inc; Series 4 or a comparable product by one of the following:
 - 1. A-1 Visual Systems.
 - 2. AARCO Products, Inc.
 - 3. ADP Lemco.
 - 4. Architectural School Products Ltd.
 - 5. Ghent Manufacturing, Inc.
 - 6. Marsh Industries, Inc.
- B. Visual Display Board Assembly: Factory fabricated.
 - 1. Corners: Square.
 - 2. Size: As indicated on Drawings.
 - 3. Mounting Method: Slip on aluminum angle clip, top and bottom, mounted directly to wall.
- C. Markerboard Panel: Low gloss white porcelain enamel steel markerboard surface laminated onto 7/16" particle board core with .005" aluminum foil backer sheet laminated to core.
- D. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch-thick, extruded aluminum; standard size and shape.
 - 1. Aluminum Finish: Clear anodic finish.
- E. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
- F. Combination Assemblies: Provide hidden spline between abutting sections of visual display panels.
- G. Chalktray: Manufacturer's standard; continuous.

1. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.
- H. Display Rail: Manufacturer's standard, extruded-aluminum display rail with plastic-impregnated-cork insert, end stops, and continuous paper holder, designed to hold accessories.
1. Size: 1-inch-high by full length of visual display unit.
 2. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches of display rail or fraction thereof.
 3. Flag Holder: One for each room.
 4. Tackboard Insert Color: As selected by Architect from full range of industry colors.
 5. Aluminum Color: Match finish of visual display assembly trim.

2.4 MARKERBOARD WALL ASSEMBLIES (MBW)

- A. Basis of Design Product: Subject to compliance with requirements, provide Claridge Products and Equipment, Inc; Marker Walls or a comparable product by one of the following:
1. A-1 Visual Systems.
 2. AARCO Products, Inc.
 3. ADP Lemco.
 4. Architectural School Products Ltd.
 5. Ghent Manufacturing, Inc.
 6. Marsh Industries, Inc.
- B. Markerboard Panel Wall Assemblies: Consisting of markerboard panels with porcelain-enamel facing, matched joints joined with steel spline for smooth alignment.
1. Panel Backing: Moisture Barrier Back.
 2. Size: As indicated on drawings.
 3. Color: White low gloss.
- C. Porcelain-Enamel Markerboard Panels: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction, consisting of moisture-barrier backing, core material, and porcelain-enamel face sheet with high-gloss finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.
1. Face Sheet Thickness: 0.021-inch uncoated base metal thickness.
 2. Medium-Density Fiberboard Core: 7/16-inch-thick; with manufacturer's standard moisture-barrier backing.
 3. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.
- D. Extruded Aluminum Trim.
1. Finish: Satin anodized 5/8-inch J-mold aluminum perimeter trim with concealed fastening system.
- E. Special-Purpose Graphics: Fuse or paint music staff lines graphic onto surface of porcelain-enamel visual display unit, in locations indicated.
- a. Music staff lines at Band Room, Choral Room and Music Technology Room markerboard as indicated on the drawings.

2.5 MATERIALS

- A. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
- B. Plastic-Impregnated-Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.
- C. Hardboard: ANSI A135.4, tempered.
- D. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
- E. Extruded Aluminum: ASTM B 221, Alloy 6063.

2.6 GENERAL FINISH REQUIREMENTS

- 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 unacceptable. 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.

2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper preparation and backing for visual display units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.

- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prime wall surfaces indicated to receive visual display units and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.

3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Field-Assembled Visual Display Board Assemblies: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.
 - 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
 - 2. Where size of visual display board assemblies or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
- C. Factory-Fabricated Visual Display Board Assemblies: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than 16 inches o.c. Secure tops and bottoms of boards to walls.

3.4 CLEANING AND PROTECTION

- A. Clean visual display units according to manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 101100

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. This Section includes the following:
 - 1. Illuminated display cases.
- B. Key Abbreviations include the following:
 - 1. DC Display Case (DC)
- C. Related Requirements:
 - 1. Section 054000 "Cold-Formed Metal Framing" for backing in walls for display cases.
 - 2. Division 26 Sections for wiring and other electrical work associated with illuminated display cases.

1.3 DEFINITIONS

- A. Display Case: Glazed cabinet.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for display cases.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work for each display case.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show location of seams and joints in tackboard panels.
 - 3. Include sections of typical trim members.
 - 4. Wiring Diagrams: Power, signal, and control wiring for illuminated units.
- C. Samples: Include actual material or color charts showing manufacturer's full range of colors.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For display cases to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of manufacturer for installation and maintenance of units required for this Project.

- B. Source Limitations: Obtain each type of product through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of display cases and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements".
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install display cases for indoor installations until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating products without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DISPLAY CASE (DC)

- A. Basis-of-Design Product: The design for display cases is based on products listed and manufactured by Poblocki & Sons. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 - 1. Newline
 - 2. Poblocki & Sons

2.3 MATERIALS AND COMPONENTS

- A. Materials and Components:
 - 1. Aluminum Extrusions: Meeting ASTM B221, alloy 6063-T5.
 - 2. Aluminum Panels: Meeting ASTM B209, minimum 0.090" thick.
 - 3. Glass: ASTM C 1048 fully tempered, Type I clear, minimum 0.25" thick.
 - 4. Tackable Surface: 1/4" thick linoleum grade cork with burlap backing.

- B. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.4 FABRICATION

A. General:

1. Comply with requirements indicated for materials, thickness, finishes, colors, designs, shapes, sizes, and details of construction.
2. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress on exposed and contact surfaces.
3. Mill joints to a tight, hairline fit.
4. Display cases to be fully factory assembled. No visible fasteners or knocked-down cases will be acceptable.
5. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.
6. Display cases to be fabricated based on dimensions as shown on the architectural drawings.
7. Coordinate dimensions and attachment methods to produce display panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.
8. Increase metal thickness or reinforce with concealed stiffeners or backing materials as required to produce surfaces without distortion, buckles, warp, or other surface deformations.
 - a. Fabricate frame from extruded aluminum. Corners to have hairline miters and be braced by means of internal aluminum angels. If welding is necessary, none should be visible. Frames shall have a continuous back-up member behind door.
 - b. Venting: Provide venting as recommended by the manufacturer to prevent condensation.

2.5 PRODUCT

- A. Display Case (DC) designations are Poblocki Sign Company. Typical components are as follows:
1. Display Case (DC-1)
 - a. Location: Instrument Storage 136
 - b. Type: Display Case.
 - c. Mounting: Recessed.
 - d. Model: Model "E".
 - e. Housing: Aluminum cabinet fully factory assembled with 3/4" AC plywood back.
 - f. Size: 5'-1 7/8"w x 1'-6"d x 5'-0"h
 - g. Doors: Sliding 1/4" tempered glass doors and ratchet locks on each side.
 - h. Finish: Clear Anodized.
 - i. Interior Cabinet Finish: 1/4" linoleum grade colored cork at background with decorative laminate at sides, top, and bottom (unless noted otherwise). Finish and colors as selected by Architect from manufacturer's standard offerings.
 - j. Lighting: LED lighting with aluminum baffle.
 - k. Lighting Location: Top within frame and header.

- l. Shelving: 1/4" thick clear Hz tempered glass with edges ground, polished or swiped as required. Depth of shelves to be 2" less than the total cabinet depth unless noted otherwise. Provide standards with brackets recessed into cork back panel.
 - m. Sets of Shelving: 4
 - n. Levels of Shelving: 2
 - o. Trim: Continuous 3/4" x 3/4" aluminum angle perimeter trim.
- 2. Display Case (DC-2)
 - a. Location: Corridor E121 at Music Department
 - b. Types: Display Case.
 - c. Mounting: Recessed.
 - d. Models: Model "B".
 - e. Housing: Aluminum cabinet fully factory assembled with 3/4" AC plywood back.
 - f. Size: 4'-10 1/4"w x 1'-6"d x 5'-8"h (typical of two units total).
 - g. Doors: Sliding 1/4" tempered glass doors and ratchet lock.
 - h. Finish: Clear Anodized.
 - i. Interior Cabinet Finish: 1/4" linoleum grade colored cork at background with decorative laminate at sides, top, and bottom (unless noted otherwise). Finish and colors as selected by Architect from manufacturer's standard offerings.
 - j. Lighting: LED lighting with aluminum baffle.
 - k. Lighting Location: Top within frame and header.
 - l. Shelving: 1/4" thick clear Hz tempered glass with edges ground, polished or swiped as required. Depth of shelves to be 2" less than the total cabinet depth unless noted otherwise. Provide standards with brackets recessed into cork back panel.
 - m. Sets of Shelving: 6 per unit.
 - n. Levels of Shelving: 3
 - o. Trim: Continuous 3/4" x 3/4" aluminum angle perimeter trim. Conjoin units vertically at center with standard aluminum trim piece.

2.6 EXAMINATION

- A. Examine walls, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine roughing-in for electrical power system to verify actual locations of connections before installation of illuminated units.
- C. Examine walls and partitions for proper backing for display cases.
- D. Examine walls and partitions for suitable framing depth where recessed units will be installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

2.7 PREPARATION

- A. Prepare recesses for display cases as required by type and size of unit.

2.8 INSTALLATION

- A. General: Install units in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Comply with requirements in Division 26 for connecting illuminated display cases.
- C. Install display case shelving level and straight.

2.9 ADJUSTING AND CLEANING

- A. Adjust doors to operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 101200

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. Provide materials, labor, equipment, inspection, coordination, and supervision necessary for the best and most complete installation per industry standards of signage.
- B. Section Includes:
 - 1. Panel signs.
 - 2. Panel signs with inserts.
 - 3. Metal signs.
 - 4. Cast metal plaques.
 - 5. Dimensional characters.
- C. Key Abbreviations include the following:
 - 1. DPL Dedication Plaque
 - 2. EMS Exterior Metal Sign
 - 3. FPS Framed Panel Sign
 - 4. IPS Interior Panel Sign
- D. Related Requirements:
 - 1. Division 22 for labels, tags, and nameplates for plumbing systems and equipment.
 - 2. Division 23 for labels, tags, and nameplates for HVAC systems and equipment.
 - 3. Division 26 for labels, tags, and nameplates for electrical equipment.
 - 4. Division 26 for illuminated, self-luminous, and photoluminescent exit sign units.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.
- B. Verify conditions at site affecting work to ensure the best and most complete installation per industry standards.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicating units and designs selected.
- B. Shop Drawings:
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show typestyles, graphic elements, including raised characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Panel Signs: Full-size sample.
 - 2. Panel Signs with Insert: Full-size sample.
- E. Product Schedule: For panel signs. Use same designations indicated on Drawings or specified.
- F. Warranty: Submit sample copy of warranty.

1.6 QUALITY ASSURANCE

- A. ADA Compliance of Interior Signage: Comply with Americans with Disabilities Act and Building Code of jurisdiction having authority. In case of conflict, comply with the more stringent requirement.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle signage in careful manner in order not to damage or mar surfaces of signs or adjacent finish surfaces as applicable.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL SIGNS

- A. Panel Sign: Decorative laminate face with applied graphics including all tactile requirements in adherence to ADA specifications. Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 1. Materials:
 - a. Sign face shall be 0.035" (nominal) standard grade, high pressure surface laminate.
 - b. The sign shall incorporate balanced construction with the core sandwiched between laminates to prevent warping.
 - c. Tactile lettering shall be precision machined, raised 1/32", matte PETG and subsurface colored for scratch resistance.
 2. Colors:
 - a. Face/background color shall be standard grade, high pressure laminate, all colors and finishes. Refer to drawings.
 3. Construction:
 - a. The laminates (front and back) shall be pressured laminated and precision machined together to a 90-degree angle. Edges shall be smooth, void of chips, burrs, sharp edges and marks.
 - b. The signage shall utilize an acrylic sphere for Grade II Braille inserted directly into a scratch resistant, high pressure laminate sign face. Braille dots are to be pressure fit in high tolerance drilled holes.
 - c. Braille dots shall be half hemispherical domed and protruding a minimum 0.025".
 - d. The signage shall utilize a pressure activated adhesive. The adhesive shall be nonhazardous and shall allow for flexing and deflection of the adhered components due to changes in temperature and moisture without bond failure.
 - e. Some signs may be installed on glass. A blank backer is required to be placed on the opposite side of the glass to cover tape and adhesive. The backer shall match the sign in size and shape.

2.2 PANEL SIGNS WITH INSERTS

- A. Panel Sign with Insert: Direct print acrylic sign system with applied graphics including all tactile requirements in adherence to ADA specifications. Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. System:
 - a. Signage shall be capable of accepting direct prints including colors, patterns, graphic images and photography. Prints shall be second surface to protect from scratches, fading or other damage.
 - b. All signs shall have a matching appearance and constructed utilizing the same manufacturing process to ensure a consistent look throughout.
 - c. Signs shall have raised copy and Braille with changeable printed insert.
 2. Materials:
 - a. Signage shall be fabricated of acrylic, 0.375" thick, comprised of two layers. The direct print shall be second surface or underside of the top layer to prevent scratching, fading or other damage.
 - b. Acrylic shall be non-glare optically clear with a P99 finish assuring no loss of clarity or composition of the print.
 - c. Tactile lettering shall be precision machined, raised 1/32", matte PETG and subsurface colored for scratch resistance.
 - d. The signage shall utilize an acrylic sphere for Grade II Braille inserted directly into a scratch resistant, high pressure laminate sign face. Braille dots are to be pressure fit in high tolerance drilled holes.
 - e. Braille dots shall be half hemispherical domed and protruding a minimum 0.025".
 - f. The signage shall utilize a pressure activated adhesive. The adhesive shall be nonhazardous and shall allow for flexing and deflection of the adhered components due to changes in temperature and moisture without bond failure.
 - g. Some signs may be installed on glass. A blank backer is required to be placed on the opposite side of the glass to cover tape and adhesive. The backer shall match the sign in size and shape.
 3. Imagery and Artwork: Architect will provide colored graphic.
 4. Printed Inserts:
 - a. The signage shall be capable of accepting paper inserts to allow changing and updating as required. Insert components shall have a 0.040" thickness non-glare acrylic window and shall be flush to sign face for a smooth, seamless appearance.
 - b. The signage contractor shall provide and install all signage inserts.
 - 1) Owner will provide copy for each sign.
 - c. Manufacturer shall provide a template containing layout, font, color, artwork and trim lines to allow Owner to produce inserts on laser or ink-jet printer. The template shall be in Word format.

2.3 METAL SIGNS

- A. Sign Faces: Faces shall be direct printed ACM, 6mm in thickness. ACM shall be rigid and flat and shall be unaffected by wide fluctuations in temperature and humidity. Edges shall be smooth without chips, burrs, sharp edge or marks. The direct print shall be first surface with a protective top-coat to prevent damage from moisture, UV, scratches and strong cleaning agents. Colors and general appearance shall be unaffected for 7 years.
 - 1. Refer to drawings for graphics, colors, and dimensions.
- B. Aluminum Extrusions: Sign shall utilize an extrusion made of aluminum alloy 6063.

2.4 CUSTOM FABRICATED STAINLESS-STEEL SIGN

- A. Refer to drawings.

2.5 CAST METAL PLAQUE

- A. Dedication Plaque: Castings shall be free from pits, scale, sand holes, or other defects. Comply with requirements specified for metal, border style, background texture, and finish and with requirements indicated for thickness, size, shape, and copy. Hand-tool and buff borders and raised copy to produce the manufacturer's standard satin aluminum finish.
 - 1. Metal: Cast Aluminum.
 - 2. Background Color: Metallic grey with pebble texture.
 - 3. Graphics Color: Satin aluminum.
 - 4. Graphics Process: 5/8" deep cast aluminum.
 - 5. Border Style: Projected bevel.
 - 6. Mounting: Rosettes, machine screw & expansion sleeves into masonry veneer.
 - 7. Protective Coating: Manufacturer's standard for exterior application.

2.6 DIMENSIONAL CHARACTERS

- A. Aluminum Cast Letters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Alloy and temper recommended by sign manufacturer for casting process used and finish indicated.
 - 1. Refer to drawings for finish, font, size, and mounting.
- B. Laminate Faced Letters: Produce laminated faced characters with smooth flat faces, sharp corners, and precisely formed lines and profiles and other defects.
 - 1. Refer to drawings for finish, font, size, and mounting.

2.7 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined.

- B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

2.8 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Preassemble signs in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

2.9 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. 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.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.10 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.11 METALLIC-COATED STEEL FINISHES

- A. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a conversion coating compatible with the organic

coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A 780/A 780M.

- B. Factory Prime Finish: After cleaning and pretreating, apply an air-dried primer compatible with the organic coating to be applied over it.
- C. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.

2.12 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 2. Directional Satin Finish: No. 4.
 - 3. Dull Satin Finish: No. 6.
 - 4. Reflective, Directional Polish: No. 7.
 - 5. Mirrorlike Reflective, Nondirectional Polish: No. 8.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer. Starting of the work will be construed as acceptance of conditions.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchorage devices embedded in permanent construction are correctly sized and located to accommodate signs.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.

3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 4. Install signs after surfaces are finished.
- B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.
- C. Layout dimensional letter signage per reviewed shop drawings.
- D. Install inserts prior to date of Substantial Completion complete with all copy in place.
- E. Wall-Mounted Interior Panel Signs: Attach panel signs to wall surfaces using method indicated below:
1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- F. Dimensional Cast Letters: Mount individual letters with manufacturer's standard concealed mounting system.
- G. Flatness Tolerance: Sign panels to remain flat under installed conditions with 1/16 inch tolerance, plus or minus, measured diagonally from corner to corner.
- H. Signs Mounted on Glass: Provide opaque sheet, same dimension 0.125" brushed aluminum plate adhered onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423

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. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.
- B. Key Abbreviations include the following:
 - 1. TC Toilet Compartment
 - 2. URSC Urinal Screen
- C. Related Requirements:
 - 1. Section 092216 "Non-Structural Metal Framing" for anchorage/blocking for attachment of partitions.
 - 2. Section 102800 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of centerlines of toilet fixtures.
 - 4. Show locations of floor drains.
- C. Samples for Initial Selection: For each type of toilet compartment material indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.
- B. Coordination: Furnish inserts and anchorages that will be built into other work for installation of toilet compartments and related items.
- C. 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. Manufacturers storage and handling instruction shall be reviewed and maintained.

1.7 WARRANTY

- A. Manufacturer: Ten (10) years against delamination, warping, breakage, corrosion and all defects in materials and workmanship.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 PHENOLIC-CORE TOILET COMPARTMENTS (TC), (URSC)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ampco Products, LLC.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. Columbia Lockers; Partition Systems International of South Carolina.
 - 4. Knickerbocker Partition Corporation.
 - 5. Tex-Lam Manufacturing, Inc.
- B. Toilet-Enclosure Style: Overhead braced.
- C. Urinal-Screens
 - 1. Style: Wall hung.
 - 2. Depth: 12 inches.

- D. Door, Panel, Screen, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch-thick doors, pilasters and demising panels.
 - 1. Compartment Depth and Width: As indicated on drawings.
 - 2. Door Width: 24 inches, minimum; at wheelchair accessible compartments, 32 inches, inside clear minimum.
 - 3. Door and Panels:
 - a. Top at 70 inches above finished floor.
 - b. Bottom at 12 inches above finished floor.
 - 4. Pilaster Width: As required to fit space; minimum 3 inches.
 - 5. Pilaster Height: 82 inches including head rail.
- E. Pilaster Shoes and Sleeves (Caps): Formed from stainless-steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.
- F. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- G. Phenolic-Panel Finish:
 - 1. Color and Pattern: Formica 912-AN; Storm with Infinity finish.
 - 2. Edge Color: Through-color matching facing sheet color.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.
 - 1. Hinges: Manufacturer's minimum 0.062-inch-thick stainless-steel continuous, spring-loaded type, allowing emergency access by lifting door. Mount with through-bolts.
 - 2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless-steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
 - 3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless-steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
 - 4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless-steel bumper at out-swinging doors. Mount with through-bolts.
 - 5. Door Pull: Manufacturer's heavy-duty cast-stainless-steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 FABRICATION

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.

- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

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. Curtain tracks and curtain carriers.
 - 2. Cubicle curtains.
- B. Key Abbreviations include the following:
 - 1. CC&T Cubical Curtain & Track
- C. Related Requirements:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for blocking and backing for mounting items requiring anchorage.

1.3 PERFORMANCE REQUIREMENTS

- A. Curtains: Provide curtain fabrics with the following characteristics:
 - 1. Fabrics are launderable to a temperature of not less than 160 deg F.
 - 2. Fabrics are flame resistant and are identical to those that have passed NFPA 701 when tested by a testing and inspection agency acceptable to authorities having jurisdiction.
 - a. Identify fabrics with appropriate markings of applicable testing and inspection agency.

1.4 ACTION SUBMITTALS

- A. Product Data: Include durability, fade resistance, and fire-test-response characteristics for each type of curtain fabric indicated.
 - 1. Include data on each type of applied curtain treatment.
- B. Shop Drawings: Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
 - 1. Include details on blocking above ceiling and in walls.
- C. Samples for Initial Selection: For each type of curtain fabric indicated.
- D. Cubical Schedule: Use same room designations as indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For tracks and curtains to include in maintenance manuals.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install cubicals until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where cubicles are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products by one of the following:
 - 1. C/S General Cubicle Company, Inc.
 - 2. Imperial Fastener Company
 - 3. InPro Corporation
 - 4. A. R. Nelson Co.
 - 5. Pryor Products.
 - 6. Salisbury Industries.

2.2 CURTAIN TRACKS (CC&T)

- A. Extruded-Aluminum Track: Not less than 1-1/4-inch-wide by 3/4 inch high; with manufacturer's standard wall thickness.
 - 1. Curved Track: Factory fabricated 12-inch-radius bends.
 - 2. Finish: Clear anodized.
- B. Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.
 - 1. End Stop: Removable with carrier hook.
- C. Curtain Carriers: Two nylon rollers and nylon axle with chrome-plated steel hook.
- D. Exposed Fasteners: Stainless steel.

2.3 CURTAINS

- A. Curtain Fabric: Cubicle manufacturer's standard, 100 percent polyester, inherently and permanently flame resistant, stain resistant, and antimicrobial.

1. Color: As selected by Architect from manufacturer's full range.
 2. Pattern: As selected by Architect from manufacturer's full range.
- B. Mesh Top: No. 50 nylon mesh.
- C. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass, spaced not more than 6 inches o.c.; machined into top hem.
- D. Curtain Tieback: Nickel-plated brass chain; one at each curtain termination.

2.4 CURTAIN FABRICATION

- A. Fabricate curtains to comply with the following requirements:
1. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than 12 inches added fullness.
 2. Length: Equal to floor-to-ceiling height, with 18 inch mesh top, and minus distance above finished floor at bottom as follows:
 - a. Cubical Curtains: 12 inches.
 3. Mesh Top: Top hem not less than 1 inch and not more than 1-1/2 inches wide, triple thickness, reinforced with integral web, and double lock stitched. Double lock stitch bottom of mesh directly to 1/2-inch triple thickness, top hem of curtain fabric.
 4. Bottom Hem: Not less than 1 inch and not more than 1-1/2 inches wide, double thickness and double lock stitched.
 5. Side Hems: Not less than 1/2 inch and not more than 1-1/4 inches wide, with double turned edges, and single lock stitched.
 6. Vertical Seams: Not less than 1/2 inch wide, double turned and double stitched.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install tracks level and plumb, according to manufacturer's written instructions. Provide track fabricated from one continuous length up to 20 feet.
1. Curtain Track Mounting: Surface.
- B. Surface Track Mounting: Fasten surface-mounted tracks at intervals recommended by manufacturer. Fasten support at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation.
- C. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.
- D. Curtain Carriers: Provide curtain carriers adequate for 6-inch spacing along the full length of the curtain plus an additional carrier.
- E. Curtains: Hang curtains on each curtain track. Secure with curtain tieback.

INGLEMOOR HIGH SCHOOL
CONCERT HALL + MUSIC BUILDING
Northshore School District No. 417

SECTION 102123
CUBICAL CURTAINS AND TRACK

END OF SECTION 102123

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. This Section includes the following:
 - 1. Impact-resistant wall-protection.
- B. Key Abbreviations include the following:
 - 1. CG-(#) Corner Guard

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include construction details, material descriptions, impact strength, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: For each impact-resistant wall-protection unit showing locations and extent. Include sections, details, and attachments to other work.
- C. Samples for Verification: For each type of impact-resistant wall-protection unit indicated.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain impact-resistant wall-protection units through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant wall-protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install impact-resistant wall-protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F for not less than 72 hours before beginning installation and for the remainder of the construction period.
- B. Field Measurements: Verify actual locations of walls, columns, and other construction contiguous with impact-resistant wall-protection units by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Basis-of-Design Product: The design for each impact-resistant wall-protection unit is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 MATERIALS

- A. Stainless-Steel Sheet: Corner guards shall be manufactured from Type 430, 16-gauge Stainless Steel.
- B. Brass sheet: Minimum 0.0500-inch-thick with fine satin finish.
- C. Attachment: Pre-drilled beveled holes.
- D. Fasteners: Nonmagnetic stainless-steel/brass screws compatible with items being fastened. Use security-type fasteners.

2.3 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards (CG): Fabricated from 1-piece, formed or extruded metal with formed edges; with degree turn to match wall condition as shown on the Drawings.
 - 1. Basis-of-Design Product: IPC Door and Wall Protection Systems, InPro Corporation, or a comparable product by one of the following:
 - a. Architectural Specialties.
 - b. Balco, Inc.
 - c. Construction Specialties, Inc.
 - d. Hiawatha Incorporated.
 - e. Korogard Wall Protection Systems; a division of RJF International Corporation.
 - f. McMaster-Carr.
 - g. Pearce Stainless.
 - 2. Locations: All locations shown on Drawings.
 - 3. Material: Stainless steel, Type 430.
 - a. Thickness: Minimum 16 gauge.
 - b. Finish: No. 4 brushed satin.
 - 4. Material: Brass 385.
 - 5. Wing Size: Nominal 1-1/2 by 1-1/2 inches.
 - 6. Height for Stainless Steel Corner Guards:
 - a. CG-1A: 48-inches
 - b. CG-1B: 82-inches
 - c. CG-1C: 40 1/2 -inches (field verify)

- d. CG-1D: 26 inches (field verify)
- 7. Height for Brass Corner Guards:
 - a. CG-2A: 94 inches.
 - b. CG-2B: 116 inches.
 - c. CG-2C: 93 inches.
- 8. Set bottom edge of corner guards 4-inches above finished floor.
- 9. Degree: 90-degrees except where noted otherwise in the Drawings.
- 10. Corner Radius: 1/8 inch.
- 11. Mounting: Flat-head, countersunk, self-tapping, stainless-steel/brass screws through factory-drilled mounting holes.

2.4 METAL FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Remove tool and die marks and stretch lines or blend into finish.
 - 2. Grind and polish surfaces to produce uniform, directionally textured, polished finish, free of cross scratches. Run grain with long dimension of each piece.
- B. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- C. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of work.
 - 1. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall-protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. General: Install impact-resistant wall-protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
 - 1. Install impact-resistant wall-protection units in locations indicated on Drawings.
 - 2. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

3.5 EXTRA STOCK & INSTALLATION

- A. Provide 6 additional 48-inch high stainless-steel corner guards, above and beyond quantity shown on the drawings, for installation as directed by Architect at no additional cost. Return unused portion to Owner at Substantial Completion.

END OF SECTION 102613

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. This Section includes the following:
 - 1. Toilet and bath accessories.
 - 2. Custodial accessories.
- B. Owner-Furnished Material: Coordinate with Owner to determine size, placement, and backing requirements. All backing and fixture installation shall be by the Contractor as part of this Contract.
 - 1. Liquid-Soap Dispenser (Hand Soap)
 - 2. Paper Towel (Roll) Dispenser
 - 3. Sanitary-Napkin Disposal Unit
 - 4. Seat Cover Dispenser
 - 5. Toilet Tissue (Roll) Dispenser
- C. Key Abbreviations include the following:
 - 1. (A)MR Accessible Mirror
 - 2. BCS Baby Changing Station
 - 3. CS Convenience Shelf
 - 4. GBR Grab Bar
 - 5. M&BH Mop & Broom Holder
 - 6. MR Mirror
 - 7. PTD Paper Towel Dispenser (FOIC)
 - 8. PTDR Paper Towel Dispenser – Recessed
 - 9. PTDW Paper Towel Dispenser and Waste Receptacle - Recessed
 - 10. SCD Seat Cover Dispenser (FOIC)
 - 11. SD Soap Dispenser (FOIC)
 - 12. SNR Sanitary Napkin Receptacle (FOIC)
 - 13. TTD Toilet Tissue Dispenser (FOIC)
- D. Related Requirements:
 - 1. Section 092216 "Non-Structural Metal Framing" for backing plates at toilet accessories.
 - 2. Section 102113 "Toilet Compartments" for compartments and partitions.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated on Drawings.
 - 2. Identify products using designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manual.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

2.2 TOILET & BATH ACCESSORIES

- A. Basis-of-Design Product: The design for accessories is based on products listed. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 - 1. Bobrick
 - 2. Bradley Corporation
 - 3. Or approved Equal.
- B. Grab Bar (GBR):
 - 1. Product: Bobrick; Model B-6806 Series
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
 - 4. Outside Diameter: 1-1/2 inches.
 - 5. Configuration and Length:
 - a. Toilet Compartments: Three pieces at each toilet compartment as shown on drawings.
- C. Mirror (MR):
 - 1. Product: Bobrick; Model B-290 1830 – Welded Frame.
 - 2. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel equipped with concealed locking devices requiring a special tool to remove.
 - 3. Size: 18" x 30".
- D. Accessible Mirror ((A)MR):
 - 1. Product: Bobrick; Model B-290 2460 – Welded Frame.
 - 2. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel equipped with concealed locking devices requiring a special tool to remove.
 - 3. Size: 24" x 60".
- E. Baby Changing Station (BCS):
 - 1. Product: Bobrick; Model KB110-SSWM
 - 2. Horizontal Wall Mounted.
 - 3. Finish: Stainless Steel.

F. Paper Towel Dispenser - Recessed (PTDR):

1. Product: Bobrick; Model B-35903.
2. Recessed in wall.
3. Finish: Stainless Steel.

G. Recessed Paper Towel Dispenser and Waste Receptacle (PTDW):

1. Product: Bobrick; Model B-39003.
2. Recessed in wall.
3. Finish: Stainless Steel.

H. Convenience Shelf (CS):

1. Product: Bobrick; Model B-295x18.
2. Finish: Stainless Steel.

2.3 CUSTODIAL ACCESSORIES

A. Basis-of-Design: Subject to compliance with requirements, provide the named product or approved equal.

B. Mop and Broom Holder (M&BH):

1. Basis-of-Design Product: Bobrick; B-239 x 34 Series.
 - a. Mounting base and shelf, three anti-slip mop holders, four hooks, satin-finish stainless steel.
2. Location: Provide at mop sink at height and location shown on the Drawings.

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

- B. Confirm proper backing has been installed behind all accessories prior to mounting. If backing is not found, promptly notify the General Contractor, and do not proceed until proper blocking is installed.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbs. when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

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. Fire-protection cabinets and brackets for the following:
 - a. Portable fire extinguishers.
- B. Key Abbreviations include the following:
 - 1. FEC+R Fire Extinguisher Cabinet (Recessed)
 - 2. FEMB Fire Extinguisher Mounting Bracket

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing mounting method and relationships of box and trim to surrounding construction.
- B. Product Schedule: For fire-protection cabinets. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule provided by Owner to ensure proper fit and function.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION

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

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to warrant defects in materials or workmanship within specified warranty period.

1. Warranty Period: One (1) year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fire-protection cabinets and accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.3 FIRE-PROTECTION CABINET (FEC+R)

- A. Cabinet Type: Suitable for fire extinguisher.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire-End & Croker Corporation.
 - b. Guardian Fire Equipment, Inc.
 - c. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - d. Larsens Manufacturing Company.
 - e. Modern Metal Products, Division of Technico Inc.
 - f. Nystrom, Inc.
 - g. Strike First Corporation of America (The).
- B. Cabinet Construction: Nonrated, unless otherwise indicated by wall type.
- C. Cabinet Material: Stainless-steel sheet.
- D. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 1. Square-edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- E. Cabinet Trim Material: Stainless-steel sheet.
- F. Door Material: Stainless-steel sheet.
- G. Door Style: Fully glazed panel with safety lock.
- H. Door Glazing: Clear tempered safety glass.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting lever handle with cam-action latch.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.

K. Materials:

1. Stainless Steel: ASTM A 666, Type 304.
 - a. Finish: No. 4 directional satin finish.
2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 1. Weld joints and grind smooth.
 2. Provide factory-drilled mounting holes.
 3. Prepare doors and frames to receive locks.
 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 2. Fabricate door frames of one-piece construction with edges flanged.
 3. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 FIRE EXTINGUISHER MOUNTING BRACKET (FEMB)

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish.

2.6 FIRE EXTINGUISHERS

- A. Fire Extinguishers: Provide fire extinguishers at all fire extinguisher cabinets and mounting bracket locations shown on the drawings according to the following schedule:
 - 1. Multi-purpose type 2A10BC at all locations shown on drawings.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:
 - 1. Fire-Protection Cabinets: 54 inches above finished floor to top of cabinet.

- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semi-recessed fire-protection cabinets.
 - 2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification: Apply decals.

3.4 ADJUSTING AND CLEANING

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

END OF SECTION 104413

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. This Section includes the following:
 - 1. Fire Department Lock Box.
 - 2. Music Instrument Wall Brackets.
- B. Key Abbreviations include the following:
 - 1. FDLB Fire Department Lock Box
 - 2. MFS Music Filing System
 - 3. MIWB Music Instrument Wall Bracket
 - 4. PHS Picture Hanging System

1.3 SUBMITTALS

- A. Product Data and Shop Drawings: Include construction details, material descriptions, dimensions of individual components and profiles, dimensions, attachment relationships, and finishes for each type of product indicated.

PART 2 - PRODUCTS

2.1 FIRE DEPARTMENT LOCK BOX (FDLB)

- A. Key Box: Key box with hinged door.
 - 1. Manufacturer: Knox Company; 3200 Series with recessed mounting kit.
 - 2. Rough-in: 6-1/2"H x 6-1/2"W x 5"D.
 - 3. Color: Dark Bronze.

2.2 MUSIC INSTRUMENT WALL BRACKET (MIWB)

- A. Tuba/Sousaphone Wall Bracket: Wall mounted, five-way adjustable to hold tuba or sousaphone.
 - 1. Manufacturer: Wenger; 049E100.
 - 2. Quantity: As shown on Drawings in Band Room.
 - 3. Warranty: Five Years.

2.3 MUSIC FILING SYSTEM

- A. Powder coated, heavy-duty steel open shelving system, complete with shelving and folders, suitable for sheet music filing.

1. Manufacturer: Music Filing Solutions; www.musicfilingsolutions.com
2. Quantity: As shown on Drawings
3. Size: 88"H x 12"D x 72"L.
4. Hanging folders: Provide the following folders.
 - a. V Based – a total of 720 folders.
 - b. 1-inch bottom – a total of 720 folders, each with label holder.
 - c. 2-inch bottom – a total of 180 folders, each with label holder.
 - d. 3-inch bottom – a total of 120 folders, each with label holder.

2.4 PICTURE HANGING SYSTEM (PHS)

- A. Picture Hanging System: Wall mounted hanging display system for artwork and other graphics.
 1. Provide and install a complete system at Lobby102 and Balcony Corridor 201 consisting of, but not limited to, the following parts:
 - a. STAS minirail + installation kit
 - 1) Quantity: 10
 - 2) Length: 78.75 – inches
 - b. Clear (perlon) cord with cobra end + STAS smartspring hook
 - 1) Quantity: 30
 - 2) Length: 59 – inches
 2. Color: White
 3. Provide shop drawings indicating complete assembly and components required for a total system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install each item in accordance with manufacturer's instructions, as detailed on drawings, and in locations indicated.
- B. Use manufacturer's hardware for assembly.
- C. Anchor securely to wall with proper hardware and backing.

END OF SECTION 109000

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Scope: Furnish, assemble, and install all production lighting fixtures, lamps, and related accessories. Aim and focus all production lighting fixtures while training designated Owner's personnel in the proper use and care of the instruments.
- B. Related Requirements: Drawings and general provisions of the Contract, including General and Special Conditions and other Division-01 General Requirement sections, apply to the work in this section.
- C. Refer to the TL series drawings for production lighting fixtures schedule for the auditorium, stage, and other related areas.

1.2 PRICES AND PAYMENT PROCEDURES

- A. Allowances: There are no allowance items in this section.
- B. Unit Prices: There are no unit price requirements in this section.
- C. Refer to Division 01 for additional project details. All production lighting fixtures shall include labor for assembly, hanging, and focusing.
- D. Substitutions:
 - 1. As required under Division 01, except where additional requirements are listed in this and other individual Sections referenced herein.
 - 2. All bids shall be submitted based exactly on the contents and brand/models as specified of the TL drawings.
 - 3. No product or device may be substituted without written authorization from the Theater Consultant. TELEPHONE REQUESTS FOR APPROVAL WILL NOT BE ALLOWED. Only properly completed and signed CSI Substitution Request Forms with full technical catalog data sheets will be considered.
 - 4. Pre-bid approval of substitute product manufacturers does not relieve the contractor and/or the product manufacturer from compliance with the functional and operational requirements of the Specifications. All products will be carefully evaluated during the submittal review process. If, at that time, any pre-bid approved substitute is found to be unsatisfactory and not in compliance, the contractor then must re-submit and supply the specified product(s) without additional costs to the Owner and/or delay to project.
- E. If a manufacturer is listed in this section of the Specification as an approved equivalent, but no specific product model is listed, then the Contractor must submit complete factory technical data sheets and a Bill of Materials of the factory's interpretation of equivalent product, along with their CSI request. Such submittal shall be handled in review as a pre-bid substitution request.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. The equipment and services covered under this section of the specifications shall not be quoted by the vendors as bundled with the equipment and services of Sections 26 09 61 & 26 09 62, but shall stand by themselves as a separate quotation to the contractor.
- B. The equipment and services covered under this section of the specification shall not be bundled as part of the scope package of the Stage Equipment Specialist defined under Section 11 61 60.
- C. A specialty stage lighting vendor (SSLV), local to the project area, shall be utilized to handle the work of this section of the specifications. The vendor shall be well versed in theatrical lighting systems from both a technical and artistic perspective. The vendor shall provide to the contractor, all the services defined within this specification section. The following companies are pre-approved only for their technical capabilities, to serve as SSLV. See item E below for complete qualification requirements:
 - 1. Stagecraft Industries – Portland, OR & Seattle, WA (503)-286-1600
 - 2. Hollywood Lights, Inc – Portland, OR & Seattle, WA (503)-232-9001
 - 3. PNTA – Seattle, WA (206) 622-7850
- D. The Contractor and the manufacturers, whose products are selected by the Contractor, shall provide fully assembled units (ready to hang and use) documented in detail in the submittals.
- E. Because the work described herein includes the provision of jobsite installation labor, each of the candidates listed above shall prove the Contractor with a fully detailed qualification statement that the firm is licensed as a contractor in the state where the project is located. Include documenting evidence that the firm is a licensed contractor, and as such, that the firm is and shall continue to be in compliance with state requirements for bonding, insurance, prevailing wage and hour regulations for the type of work described in this specification. SSLV candidate firms who do not or cannot provide such documentation shall not be acceptable.

1.4 SUBMITTAL REQUIREMENTS

- A. Submittals for Review: Furnish a detailed Bill of materials for all work, including and manufacturer's catalog cuts for each type of lighting instrument, showing performance with various lamps. Furnish catalog cuts for all Accessories. Cross-reference each item with the fixture or accessory ID number from the TL series drawings.
- B. If the Architect or Theater Consultant do not discover missing or conflicting elements in the submittals that are in conflict with the contract documents, the Contractor and the manufacturers are still required to comply with the contract documents.

1.5 REFERENCES

- A. Abbreviations and Acronyms: Refer to TL0.10 for any special definitions related to this work
- B. Definitions: Refer to TL0.10 for any special definitions related to this work

C. Reference Standards:

1. The following listed codes, standards, and regulations refer to the latest current edition and are to be considered a part of this Section: ASTM, AISC, NEC, NESC, NEMA, NFPA, UL, IEEE, ANSI, USITT, PLASA, ESTA, OSHA, and IBC.
2. All equipment where applicable standards have been established shall be listed and labeled by Underwriter's Laboratories or other locally approved testing agency. All Lighting Instruments and Electrical Accessories shall be UL listed and labeled for use as theatrical lighting.
3. Contractor is responsible for insuring compliance with all applicable building, product, and installation codes (including but not limited to the IBC and NEC) that are in effect at the time of the installation. Corrections to any product, assembly or work performed under this contract to obtain code compliance shall be at contractor's expense.
4. Custom assemblies shall meet all applicable codes and where local jurisdictions require shall be inspected and approved by the local code authority at the Contractor's expense.
5. Custom field assemblies shall meet all applicable codes and where local jurisdictions require shall be inspected and approved by the local code authority at the Contractor's expense.

1.6 TEMPORARY FACILITIES AND CONTROLS

- A. Temporary Use of Permanent Work: Refer to Division 01 requirements.
- B. Additional to Division 01 requirements, use of fixtures and devices provided under this section shall require the Contractor to clean and refurbish item(s) to "as new out of box" condition and replace used lamp with new lamp over and above lamp quantities specified herein.

PART 2 - PRODUCTS

2.1 STANDARD ACCESSORIES

- A. Each luminaire shall be provided with the standard accessories as listed on the Stage Lighting Instruments Schedule on the TL Drawings.

2.2 LED ZOOM ELLIPSOIDALS (TB1, TB2, TC1)

- A. Furnish, install, configure and aim as per this section of the specification, in types and quantities as defined in the Production Lighting Fixtures Schedule on the TL series drawings.

2.3 LED ELLIPSOIDAL SPOTLIGHTS (TD1)

- A. Furnish, install, configure and aim as per this section of the specification, in types and quantities as defined in the Production Lighting Fixtures Schedule on the TL series drawings.

2.4 LED FOLLOWSPOT (Type TK1)

- A. Furnish, install, configure and aim as per this section of the specification, in types and quantities as defined in the Production Lighting Fixtures Schedule on the TL series drawings.

2.5 LED SAFETY LIGHT (Type TL)

- A. Furnish, install, configure and aim as per this section of the specification, in types and quantities as defined in the Production Lighting Fixtures Schedule on the TL series drawings.

2.6 AUTOMATED ELLIPSOIDAL (TM)

- A. Furnish, install, configure and aim as per this section of the specification, in types and quantities as defined in the Production Lighting Fixtures Schedule on the TL series drawings.

2.7 LED CONCERT WALL COLOR WASH (TO)

- A. Furnish, install, configure and aim as per this section of the specification, in types and quantities as defined in the Production Lighting Fixtures Schedule on the TL series drawings.

2.8 PRODUCTION LIGHTING ACCESSORIES

- A. Furnish and install accessories as needed to execute the production lighting plot, and deliver remainder to Owner with allocated inventory. Equipment package shall be in types and quantities as defined in the Production Lighting Accessories Schedule on the TL series drawings.

PART 3 - EXECUTION

3.1 PRODUCTION LIGHTING HANG & FOCUS PLOT

- A. Execute a production lighting hang & focus plot for all new fixtures and accessories. The focus plot shall be provided by the Northshore School District Tech Staff. Use the accessories included in this specification section and as listed in the Production Lighting Accessories Schedule in the TL series drawings, to execute a fully functional hang and focus. Record any deviations made in the field, for an As-Built version of the hang and focus plot.
- B. After completion of assembly, hang and focus, provide two (2) record copies of actual plot documentation on 30"x 42" bond paper. Provide lighting plot in both AutoCAD and Adobe PDF file formats to Owner and to Consultant for record.

3.2 TRAINING

- A. Provide an experienced trained production lighting specialist to perform up to 8 hours (two sessions of 4 hours each for Auditorium) of on-site implementation and instruction to the Owner or designated representatives regarding the proper use, operation and maintenance procedures for the luminaires concurrent to the training for the dimming system specified elsewhere.
- B. Trained production lighting specialist shall demonstrate proper use, hanging, safety practice, aiming and blending of each type of production lighting fixture. Similar depth of training shall be performed for all production lighting accessories.

3.3 TESTING

- A. Test each fixture and all related accessories for proper functionality and safe operation while connected in place to the distribution devices covered under specification section 260962 and powered by the tested and operational dimming and control system covered under specification section 260961.

3.4 WARRANTY/GUARANTEE

- A. All major components shall carry a manufacturer's and/or installer's warranty, which shall guarantee against defects in materials and workmanship for a period of two years, commencing at Final Completion. Refer to Division 01 for requirements related to Closeout Procedures & Closeout Submittals for other general requirements.
- B. Warranty must include all shipping expenses including, but not limited to, return shipping of items which do not meet these specifications.
- C. The warranty period shall not start until Final Completion.
- D. The Contractor shall warrant materials and workmanship of systems and equipment installed as free of defects. The Contractor shall guarantee in writing the repair or replacement within two calendar weeks for any item found defective during the warranty period as defined in 3.4, A above. Ordinary wear and defects due to improper usage is an exception.
- E. During the warranty period, all emergency conditions where system failures may be hazardous or may cause severe hardship or cancellation of events and performances shall be responded to within 24 hours.
- F. If start of warranty is delayed due to delay in contractor completing the punchlist items, and owner has commenced use of the facility, the Contractor shall provide the same level of service and responsibility defined herein.
- G. Contractor shall honor and service warranty on tungsten-halogen lamps and LED light engines. Warranty period for lamps shall start at approved completion of services described in this section of the specification.

END OF SECTION 116171

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes:
 - 1. Safety pads for protection of piano storage located at Backstage Storage 118.
- B. Key Abbreviations include the following:
 - 1. WPD Wall Pad
- C. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for prefabricated plywood backing panels to be provided as backing for surface mounted equipment and furnishings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: Color charts representing manufacturer's full range of standard color options for safety pads.
- C. Samples for Verification: For the following products:
 - 1. Pad Fabric: Not less than 3 inches square, with specified treatments applied. Mark face of material.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install wall pads until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 SAFETY PADS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Draper, Inc.
 - 2. Performance Sports Systems.
 - 3. Porter Athletic Equipment Company.
 - 4. Arizona Courtlines, Inc. (ACI).
 - 5. Others only as approved prior to bidding.
- B. Pad Coverings: Provide safety pad fabric covering fabricated from puncture- and tear-resistant, not less than 14-oz./sq. yd PVC-coated polyester or nylon-reinforced PVC fabric treated with fungicide for mildew resistance; with surface-burning characteristics indicated.
- C. Wall Safety Pads (WPD): Padded wall wainscot panels designed to be attached in a continuous row; each panel section consisting of fill laminated to backer board with visible surfaces fully covered by seamless fabric covering, free of sag and wrinkles and firmly attached to back of backer board.
 - 1. Backer Board: Not less than 7/16-inch- thick oriented strand board.
 - 2. Fill: Multiple-impact-resistant foam not less than 2-inch- thick polyurethane, 3.5-lb/cu. ft. density.
 - 3. Size: Each panel section, 48 inches wide by 48 inches high.
 - 4. Number of Panel Sections: As indicated modular panel sections.
 - 5. Installation Method: Z-clip wall attachment. No nailing margins.
 - 6. Fabric Covering Color: As selected by Architect from manufacturer's full range for one color.
 - 7. Provide cutouts and molded inserts as required to accommodate electrical and data outlets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for alignment of mounting substrates, installation tolerances, operational clearances, locations of building electrical system, and other conditions affecting performance.
 - 1. Verify critical dimensions.
 - 2. Examine supporting structure.
 - 3. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements have been clearly marked. Locate reinforcements and mark locations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written installation instructions.
- B. Unless otherwise indicated, install wall pads after other finishing operations, including painting, have been completed.
- C. Wall Safety Pads: Mount with bottom edge at 4 inches above finished floor.

3.3 CLEANING

- A. After completing wall pad installation, inspect components. Remove spots, dirt, and debris and touch up damaged shop-applied finishes according to manufacturer's written instructions.
- B. Replace wall pads that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 116623

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. Horizontal louver blinds with aluminum slats.
- B. Key Abbreviations include the following:
 - 1. HBL Horizontal Blinds
- C. Related Requirements:
 - 1. Section 092216 "Non-Structural Metal Framing" for anchorage/blocking for mounting horizontal louver blinds and accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
 - 1. Identify which side of interior relites blinds will be mounted.
 - 2. Identify which side will have operator.
 - 3. Identify which side will have lift-cord.
- C. Samples for Initial Selection: For each type and color of horizontal louver blind.
 - 1. Include Samples of accessories involving color selection.
- D. Product Schedule: For horizontal louver blinds. Use same room designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS (HBL)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hunter Douglas Contract.
 - 2. Levolor Contract; a Newell Rubbermaid company.
 - 3. Springs Window Fashions; SWFcontract.
- B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.
 - 1. Width: 1 inch.
 - 2. Thickness: Not less than 0.006 inch.
 - 3. Spacing: Not less than every 0.85 inch.
 - 4. Finish: Ionized antistatic, dust-repellent, baked polyester finish.
 - 5. Features:
 - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.

- C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.
 - 1. Capacity: One blind per headrail.
 - 2. Ends: Capped or plugged.
 - 3. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within blind full operating range.
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 - 4. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Operator: Clear-plastic wand.
 - c. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
 - 5. Manual Lift-Operator and Tilt-Operator Lengths: Full length of blind when blind is fully closed plus extension as required for high windows.
 - 6. Integrated Headrail/Valance: Curved face.
- D. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.
 - 1. Type: Bottom contoured to minimize light gaps.
- E. Lift Cords: Manufacturer's standard braided cord.
- F. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
 - 1. Type: Braided cord.
- G. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
 - 1. Type: Overhead.
 - 2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.
- H. Colors, Textures, Patterns, and Gloss:
 - 1. Slats: As selected by Architect from manufacturer's full range.
 - 2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.3 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
 - 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Locate so exterior slat edges are not closer than 2 inches from interior faces of glass.
 - 2. Install mounting and intermediate brackets to prevent deflection of headrails.

- 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.
- B. Jamb Mounted: Install headrail flush with face of opening jamb and head unless indicated otherwise on drawings.

3.3 ADJUSTING

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

3.4 CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

END OF SECTION 122113

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. Interior manually-operated and motor-operated, single roller, roller shade systems.
- B. Key Abbreviations include the following:
 - 1. RWS Roller Window Shade
 - 2. RWS+E Roller Window Shade – Electric
- C. Related Requirements:
 - 1. Section 092216 "Non-Structural Metal Framing" for anchorage/blocking for mounting roller shades and accessories.
 - 2. Division 26 Sections for electrical service and connections for motor operators, controls, limit switches, and other powered devices and for system disconnect switches for motorized shade operation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including opening sizes, tolerances required, method of attachment, shadeband materials, their orientation to rollers, and their seam and batten locations.
 - 1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified, 10 inches long.
- D. Samples for Initial Selection: For each type and color of shadeband material.
 - 1. Include Samples of accessories involving color selection.
- E. Product Schedule: For roller shades. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of shade band material.
- C. Product Test Reports: For each type of shade band material.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.
 - 1. Include name and contact information of local service company.

1.6 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Resistance ratings: Passes NFPA 701.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by UL or other testing agency acceptable to authorities having jurisdiction and marked for intended use.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.
- B. Handle and store materials according to manufacturers recommendations protecting materials and finishes from damage, marring of finishes or soiling.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Coordinate work with window installation and placement of concealed blocking.

1.9 WARRANTY

- A. Provide a limited installation warranty covering the following:
 - 1. Shade Hardware: Ten (10) years.
 - 2. Electronic Control Equipment: Five (5) years.
 - 3. Fabrics/Shade Cloth: ten (10) years.
 - 4. Aluminum and Steel Coatings: Ten (10) years.
 - 5. Chain: Ten (10) years.
- B. Provide a limited installation warranty from Date of Substantial Completion, covering a period of one (1) year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 ROLLER SHADES (RWS+E), (RWS)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Draper Inc.
 - 2. Hunter Douglas Contract.
 - 3. Lutron Electronics Co., Inc.
 - 4. MechoShade Systems, Inc.
- B. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated and recommended by manufacturer, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
 - 1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Chain-and Clutch Operating Mechanisms: Chain-driven operator capable of operating fabric panels from 13 to 16 feet wide (maximum width varies by fabric weight) and up to 20 feet tall with a maximum allowable pull force of 9 pounds. Utilization of adjustment-free continuous qualified T304 stainless ball chain with 110 lbs. breaking strength for precise control, smooth operation, and ensures a uniform look. Components must be maintenance-free from adjustments for lubrication for trouble-free lifetime operation.

1. Bead Chains: Stainless-steel.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain Retainer Type: Chain tensioner, jamb mounted.
 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than 10lbs. or for shades as recommended by manufacturer, whichever criteria is more stringent.
- D. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
1. Roller Drive-End Location: As indicated on Drawings.
 2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- E. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- F. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.
- G. Installation Accessories:
1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 3 inches.
 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
 - a. Height: Manufacturer's standard in height required to enclose roller and shadeband assembly when shade is fully open, but not less than 3 inches.
 3. Endcap Covers: To cover exposed endcaps.
 4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosed designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open but not less than 4-inches.

- b. Provide pocket with lip at lower edge to support acoustical ceiling panel where occurs.
- 5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
 - a. Closure-Panel Width: 2 inches.
- 6. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 - 1. Source: Roller shade manufacturer.
 - 2. Type: PVC-coated fiberglass or PVC-coated polyester.
 - 3. Weave: Basketweave.
 - 4. Thickness: .024 inches.
 - 5. Weight: 16.25 oz/sq. yd.
 - 6. Roll Width: Match window size(s).
 - 7. Openness Factor:
 - a. 1 percent unless noted otherwise.
 - b. 5 percent at Lobby 102 curtainwall.
 - 8. Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Enclosed in sealed pocket of shadeband material.
 - 9. Color and Finish: As selected by Architect from manufacturer's full range.

2.4 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
 - 2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
 2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

2.5 SHADE MOTOR DRIVE SYSTEM

- A. Shade Motors: Electronic Drive Unit (EDU).
1. Intelligent Encoded EDU, and Control System: Tubular, asynchronous (non-synchronous) EDU's, with built-in reversible capacitor operating at 120VAC/60hz, (230VAC/50Hz) single phase, temperature Class B, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each EDU.
 2. Quite {42-46 dB} (within 3 feet open air).
 3. Conceal EDU's inside shade roller tube.
 4. Maximum current draw for each shade EDU of 0.9amps at 120VAC.
 5. Use EDU's rated at the same nominal speed for all shades in the same room.
 6. Use EDU's with minimum of 34 RPM that shall not vary due to load/lift capacity.
 7. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade EDU and tube assembly.
- B. EDU System: (software, two-way communication): Specifications and design are based on the Intelligent EDU Control System, WhisperShade IQ System) as manufactured by MechoSystems. Other systems may be acceptable providing all the following performance capabilities are provided. EDU and control systems not in complete compliance with these performance criteria shall not be accepted as equal systems.
1. EDU shall support two methods of control
 - a. Local Dry Contact Control Inputs
 - 1) EDU shall be equipped with dry contact inputs to support moving the EDU/shade to the upper and lower limits.
 - 2) EDU shall be equipped with dry contact inputs to support moving the EDU/shade to local switch preset positions.
 - 3) Shall Support configuring the EDU under protected sequences so that a typical user would not change the EDU's setup. At a minimum the configuration should include setting limits, setting custom presets and configuring key modes of operation.
 - b. Network Control

- 1) EDU shall be equipped with a bi-directional network communication capability in order to support commanding the operation of large groups of shades over a common backbone. The network communication card shall be embedded into the tubular EDU assembly.
2. Upper and lower stopping points (operating limits) of shade bands shall be programmed into EDU's using either a handheld removable program module/configurator or local switch.
3. Alignment Positions: Each EDU shall support a minimum of 133 repeatable and precisely aligned intermediate shade positions (including limits and presets).
 - a. All shades on the same switch circuit or with the same network group address with the same opening height shall align at each limit or preset (intermediate stopping position) when traveling from any position, up or down.
 - b. Shades of differing heights shall have capability for custom, aligned intermediate stop positions when traveling from any position, up or down.
 - c. Alignment of shades mechanically aligned on the same EDU shall not exceed +/- 0.125 inches (3.175mm) when commanded to the same alignment position.
 - d. Alignment of shades on adjacent EDU's shall not exceed +/- 0.25" inches (6.35mm) when commanded to the same alignment position.
 - e. Local Switch Presets: A minimum of 3 customizable preset positions shall be accessible over the local dry contact control inputs and over the network connection.
 - 1) Upon setting the limits for the shade EDU these preset positions shall automatically default to 25%, 50% and 57% of the shade travel.
 - 2) These positions shall be capable of being customized to any position between and including the upper and lower limits of the shade. A removable program module/configurator or local switch shall be capable of customizing the position of these presets.
 - f. Network Presets: A minimum of 29 customizable preset positions (including the 3 local switch presets) shall be accessible via network commands.
 - 1) Upon setting the limits for the shade EDU these preset positions shall automatically default to the lower limit unless customized elsewhere.
 - 2) These positions shall be capable of being customized to any position between and including the upper and lower limits of the shade. A removable program.
4. Network Control
 - a. The system shall have the capability of two-way digital communication with the EDU's over a common backbone.
 - b. Each EDU shall possess 8 addresses capable of being employed for various levels of group control. These addresses shall be configurable via a handheld configurator and/or a PC controller. A 9th unique address shall enable the EDU(s) to be independently controlled and configured over the network via a handheld configurator and/or a PC controller.
 - c. Low Voltage Communication Network Implementation.

- 1) The low voltage network shall employ a bus topology with daisy chained network connections between nodes over a CAT5 cable (4 UTP) or over a 2 UTP cable employing at least 1 pair at 16 AWG for power and 1 pair at 22 AWG for data.
 - 2) The low voltage network (+/- 13VDC) shall be powered by the nodes attached to it. These nodes could be line voltage powered EDU's attached to 120 VAC or 230 VAC. Alternatively, low voltage nodes shall be powered typically by a centralized low voltage power supply. If a CAT5 network cable is employed and the node draws less than 1W then the node may be powered by DC power supplied by an associated line voltage EDU.
 - 3) Network Capacity: 4000 ft max, 250 nodes max
 - a) The number and size of a centralized DC supply shall vary depending upon the network requirements.
5. Operating Modes
- a. Uniform or Normal Modes of Operation:
 - 1) Uniform mode shall allow for shades to only move to defined intermediate stop positions to maintain maximum uniformity and organization.
 - 2) Normal Mode shall allow for shades to move to both intermediate stop positions, plus any position desired between the upper and lower limits as set by the installer.
6. Wall Switches:
- a. Shades shall be operated by, 5, 7, or 10 button low voltage standard switches, or programmable intelligent switches (IS). Standard switch shall be wired to a bus interface and the bus interface will be programmed to transmit an address for the local switch.
 - b. Intelligent switches may be installed anywhere on the bus line. Each IS shall be capable of storing one control level address to be broadcast along the bus line.
 - c. An address that is transmitted by either a switch or central controller shall be responded to by those EDU's with the same address in their control table.
 - d. IS shall provide for interface with other low voltage input devices via a set of dry contact terminals located on the switch.
 - e. Standard switch or IS may control an individual, sub-group or group of EDU's in accordance with the address in each EDU.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TURN-KEY RESPONSIBILITY

- A. Turn-Key Responsibility for Interior Roller Shades: To control the responsibility for performance of the electric roller shade system; assign the design, engineering and installation of electronic drive roller shade control system, shades, addressable controls, communication interfaces and any required sensors and switches specified in this Section to the manufacturer of the shade and control systems. The Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, and/or motor controllers of the motorized roller shades. Power wiring (line voltage) will be provided by the roller shade dealer, in accordance with the requirements provided by the manufacturer. The General Contractor shall coordinate requirements of the roller shade dealer before inaccessible areas are constructed.
 - 1. Window Covering Subcontractor (WC) Responsibilities:
 - a. WC will provide J-Box leads, Splitters, Sensors and communication interfaces (if required) to the General Contractor/Electrical Subcontractor.
 - b. Locations for all visible devices to be coordinated with Architect.

3.3 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.
- C. Roller Shade Locations: As indicated on Drawings.

3.4 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.5 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 122413

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 the work of this section.

1.2 SUMMARY

- A. Casework: The Section includes all labor, equipment, hardware and materials to furnish and install plastic laminate casework, plastic laminated countertops, epoxy resin countertops, wainscoting and window stools. This includes but is not limited to all cabinets, tops and related items to provide a complete installation. Cut-outs for cabinet-installed sinks, fixtures and appliances are also part of this Section.

- B. Key Abbreviations include the following:

| | | |
|-----|------|--------------------------------|
| 1. | BC | Base Cabinet |
| 2. | CH | Coat Hook |
| 3. | CHS | Cubby Hole Storage |
| 4. | CSB | Countertop Support Bracket |
| 5. | CSWK | Casework |
| 6. | DB | Drawer Base |
| 7. | DBC | Drawer Base Cabinet |
| 8. | EP | End Panel |
| 9. | FDB | File Drawer Base |
| 10. | FP | Filler Panel |
| 11. | GRMT | Grommet |
| 12. | HRS | Hanging Rod Storage |
| 13. | HWDT | Hardwood Trim |
| 14. | ISC | Instrument Storage Cabinet |
| 15. | KS | Knee Space |
| 16. | PLAM | Plastic Laminate |
| 17. | PLBS | Plastic Laminated Backsplash |
| 18. | PLCT | Plastic Laminated Countertop |
| 19. | PLH | Padlock Hasp |
| 20. | PLWS | Plastic Laminated Window Stool |
| 21. | PWD | Plywood |
| 22. | SBC | Sink Base Cabinet |
| 23. | SHB | Shelf Base |
| 24. | SKS | Sink Knee Space |
| 25. | SSB | Shelf Support Bracket |
| 26. | TSC | Tall Storage Cabinet |
| 27. | TSS | Tall Shelf Storage |
| 28. | TWC | Teacher's Wardrobe Cabinet |
| 29. | WSC | Wall Storage Cabinet |

C. Related Sections:

1. Division 06 Section "Rough Carpentry" for blocking in walls where required for anchoring casework and counter supports.
2. Division 06 Section "Interior Finish Carpentry" for wainscots and other wall surfaces finished with plastic laminate.
3. Division 09 Section "Resilient Base and Accessories" for resilient base applied to casework.
4. Division 09 Section "Painting" for field finishing of installed interior architectural woodwork, if any.
5. Division 22 Sections for sinks, faucets and connections to such items.
6. Division 26 and 27 Sections for electrical and communications fixtures and connections to such items.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions indicating materials, hardware, and finishes used in fabrication as required to show compliance with specifications.
- B. Shop Drawings: In accordance with the General Conditions and Division 01 specification sections, submit shop drawings indicating location and size of each type of cabinet and countertop, accessories, materials, finishes, hardware types and locations, fillers, etc. Include fully dimensioned plans and elevations and indicate details of anchorage to countertop and to walls.
1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcing specified in other Sections.
 2. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in casework.
 3. Show location(s) of each item, dimensioned plans and elevations, large scale details, attachment devices and other components. Locate sink centerlines for guidance of other trades.
- C. Samples and Color Selection: Submit samples showing full range of standard and premium plastic laminate colors including all solids and patterns, edge colors and hardware samples for selection and/or approval before fabrication.
- D. Color Selection shall be as follows:
1. Plastic Laminate: Plastic Laminate by Architect from manufacturer's full range of standard and premium colors including all solids and patterns. Laminates to be selected from Formica, Nevamar and Pionite. Up to (8) colors will be selected from multiple manufacturer's.
 2. Balancing Sheet and Polyester laminate: as selected by Architect from manufacturer's full standard offering of colors.
 3. Edge Banding: Doellken-Woodtape Edgebanding. Color as selected by Architect from manufacturer's full offering of colors.
- E. Keying Schedule

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility for Fabrication and Installation: Firm experienced in producing and installing architectural casework similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work. Manufacturer to assume undivided responsibility for fabricating, finishing, and installing casework specified in this Section
- B. Quality Standard: Except as otherwise indicated, comply with the following standard:
 - 1. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the architectural Woodwork Institute for grades of interior architectural casework, construction, finishes, and other requirements.
 - 2. The Contract Documents contain selections chosen from options in the Quality Standard as well as additional requirements beyond those of the Quality Standard. Comply with such selections and requirements in addition to the Quality Standard.
- C. Reference Standard: All materials shall conform to these requirements:
 - 1. Decorative, High Pressure Plastic Laminate: NEMA LD-3.
 - a. Horizontal Grade .050" = GP50.
 - b. Post-forming Grade .042" = PF42.
 - c. Vertical Grade .028 = VG28.
 - d. Cabinet Linear Grade .020 = CL20.
 - e. Chemical Resistance Grade .036".
 - 2. Low Pressure Thermofused Polyester and Melamine Laminates: ALA (American Laminators Association).
 - 3. PVC Edgebanding: Seamless roles to be applied with automatic edge banding machines using hot-melt adhesives. Product to be chip proof, flame and moisture resistant.
 - 4. Particleboard: ANSI 208.1 (American National Standards Institute).
 - 5. Softwood Plywood: U.S. Product Standards PS1.
 - 6. Hardwood: ANSI AHA 135.484 (American Hardboard Association)

1.5 CASEWORK DEFINITIONS

- A. Exposed Portions – Surfaces visible when:
 - 1. All surfaces visible when doors and drawers are closed
 - 2. Cabinets and shelves are open-type or behind clear glass doors.
 - 3. Cabinet tops under 72" above finished floor, or over 72" above finish floor if visible from an upper building level.
 - 4. Visible edges of cabinet ends, doors and drawer fronts.
 - 5. Sloping tops of cabinets are visible.
 - 6. The underside bottoms of wall hung cabinets, where bottom is 42-inches or more above finished floor.
 - 7. Portions of cabinets are visible after fixed appliances are installed.
 - 8. Front edges of cabinet body members are visible or seen through gap of greater than 1/8" with doors or drawers closed.

B. Semi-Exposed Portions – Surfaces visible when:

1. Doors and drawers are open including interior faces of hinged doors.
2. Bottoms of cabinets; where bottom is below 42-inches above finished floor.
3. Portions of bottoms, tops and ends in front of sliding doors in closed position.

C. Concealed Portions - When:

1. Surfaces are not visible after installation.
2. Stretchers, blocking and/or components are concealed by drawers.
3. Underside of bottoms of cabinets less than 30" above the finished floor.
4. Flat tops of cabinets 72" or more above the finished floor, except if visible from an upper building level.
5. The three non-visible edges of adjustable shelves.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect casework during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver casework until painting 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 whose environmental conditions meet requirements specified in "Project Conditions" of this Section.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Obtain and comply with casework fabricator's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install casework until these conditions have been attained and stabilized so that woodwork will be within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.
- C. Field Measurements: All measurements are to be verified at the job site before fabrication to ensure a scribe fit of casework, countertops and window stools. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.

1.8 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide casework by one of the following:
 - 1. Advanced Cabinets
 - 2. Central Cabinets
 - 3. Genothern
 - 4. Pacific Cabinets
 - 5. Others only as approved prior to bidding.

2.2 MATERIALS

- A. Exposed Portions
 - 1. All exposed vertical surfaces shall be high pressure laminate, .028" minimum thickness meeting NEMA LD-3 standards laminated with PVA adhesive under 50 PSI pressure.
 - 2. Countertops shall be finished with .050" thick NEMA grade high pressure plastic laminate except as otherwise required. Countertops to be balanced with backing sheet of .020" thick balancing sheet on underside of core to provide a moisture-proof and stable countertop.
 - 3. Woodgrain patterns shall run vertically on doors, drawer fronts, ends and fixed panels.
 - 4. Exposed to view interiors, including exposed to view shelving, to match exterior laminates.
- B. Semi-exposed Portions
 - 1. Low pressure thermofused melamine meeting ALA standards. Lamination is achieved through self-bonding of the resin under 300 PSI at 320 degrees F.
 - 2. Interior faces of tops, bottoms, ends, partitions, and shelves shall be overlaid with low pressure thermofused melamine laminate or high pressure plastic laminate, as noted above for semi-exposed locations.
 - 3. Cabinet backs and drawer bottoms shall have factory applied coating to both faces. Interior face to match cabinet interior color.
 - 4. Small vertical or horizontal dividers shall be 1/4" thick tempered hardboard, color to match cabinet interior.
- C. Concealed Portions, Cores and Substrates
 - 1. Concealed materials shall be any species of sound, dry solid stock, plywood, particleboard, medium density fiberboard, or a combination thereof, unless noted otherwise herein.

2. All materials shall be securely glued with type III adhesive meeting ASTM-D3110 standards.
3. Laminate core material shall be premium grade particleboard, 45 lb. density meeting ANSI-208.1 standards in either fir or pine composition unless specified otherwise under Fabrication.

D. Visible Edges, Exposed and Semi-Exposed

1. Exposed edges of cabinet ends, tops, bottoms, shelves, doors and drawer fronts shall be edge banded with 3mm thick PVC edge banding, machine applied with hot melt adhesive.
2. Edges at underside of upper cabinets and drawer parts shall be edgebanded with 0.018" PVC to match cabinet interior, unless specified otherwise herein.
3. Machine applied edgebanding shall be applied after face laminates are applied.

2.3 HARDWARE

- A. Exposed Hardware Finish: Except where not available or specified otherwise, provide exposed hardware with BHMA Code 626 satin chrome plate finish (US26D); where not available, provide either satin aluminum, or stainless steel.
- B. Swing Hinges: Five knuckle, radius tips 2 3/4" x .083" fastened with 4 screws to end panel and 5 screws to door panel to provide maximum strength, with door opening of 270 degrees. No edge fastening permitted. Provide one pair for doors up to 4 feet height and 1-1/2 pair for doors over 4 feet.
- C. Door and Drawer Pulls: 5/16" Bent wire design 96mm x 32mm made of solid brass in satin chrome (US26D) finish.
- D. Drawer Slides.
 1. Standard Drawers: Full extension, zinc finish with 100 lb. load rating. Provide positive in and out stops, stay close detent and steel ball bearings.
 2. File Drawers: Full extension, zinc finish with 150 lb. rating. Provide positive in and out stops, stay close detent and steel ball bearings.
- E. Adjustable Shelf Support: Adjustable shelf support system with "L" clips and 5 mm diameter predrilled holes 32 mm on center. Provide the following:
 1. Nickel plated steel clips with security pin.
- F. Clothes Rod: 1" diameter chrome-plated steel rod, wall thickness .120". Knappe & Vogt #770-1. Rod support flanges #734 closed, #735 open.
- G. Catches: Magnetic type – 7 lb. pull rating with metal baseplate and plastic housing to match cabinet interior.
- H. Drawer Accessories.
 1. Standard Hanging Files: PVC rails fitted to top of drawer sides. Available for both letter and legal size files. Rails colored to match cabinet interior.

- I. Locks (LK): Provide Olympus Lock at locations indicated on drawings. Slide bolt used on inactive door
 - 1. Basis of Design: Olympus 100/200 series.
 - 2. Locks keyed as follows:
 - a. All classrooms separate.
 - b. All other rooms keyed separate.
 - c. One master key to control all locks.
- J. Grommets (GRMT): 65 mm (2 ½") with removable and adjustable cap. Color as selected by Architect.
- K. Countertop Support Brackets (CSB): 1 ½" tube steel, powder coated bracket to support countertops.
 - 1. Provide 18" x 21" bracket to support countertops up to 26" deep.
 - 2. Provide 21" x 27" bracket to support countertops up to 32" deep.
- L. Coat Hooks (CH): Wall mount, 3-prong, 1-3/4" projection, diecast, polished chrome.
- M. Padlock Hasp (PLH): Padlockable cam lock. Zinc die cast housing and cylinder. Accepts a shackle diameter up to 25/64". US26D finish. Olympus DCP500, or equal.

2.4 DRAWERS

- A. Fronts: Shall be 11/16" thick particleboard overlaid with high pressure plastic laminate on both faces. Inside color to match cabinet interiors with face color to be selected.
 - 1. Edges banded with 3mm PVC. These edges shall be machine applied with hot melt adhesive and trimmed to a radiused corner.
- B. Sides: Shall be 1/2" plywood overlaid with thermofused melamine on two sides to match cabinet interior. Top edges banded with .018 PVC to match interior. Drawer parts joined together with 6mm x 25mm hardwood dowels 32mm on centers.
- C. Sub-fronts, and Backs: Shall be 1/2" plywood with factory applied coating to both faces. Bottoms shall be tongued into sides, back and sub-front, glued and clamped to produce a rigid square drawer. Interior face color to match cabinet interiors.
 - 1. Drawer fronts shall be attached to the sub-fronts with minimum of four (4) #8 x 1" panhead screws.
- D. Bottom: Prefinished hardboard 1/4" thick with smooth uniform face.
- E. Drawers shall be mounted with positive in and out stops to provide permanent and quiet operation. Drawer fronts that impact cabinet body will not be allowed.
- F. Full depth security panel shall be provided between all drawers when individual drawer locking is required.

2.5 DOORS

- A. Doors: Shall be 11/16" thick particleboard overlaid with a high pressure plastic laminate on both faces. Inside color to match cabinet interiors with face color to be selected.
- B. Edges: Banded with 3mm PVC.

2.6 CABINET ENDS, TOPS AND BOTTOMS

- A. Semi-exposed ends, tops and bottoms shall be 3/4" particleboard overlaid with thermofused melamine or high pressure plastic laminate on both faces, as applicable.
- B. Exposed or finished end shall be 11/16" thick particleboard overlaid with high pressure plastic laminate on both faces to equal 3/4" thickness. Inside color to match cabinet interiors with face color to be selected.
- C. Ends shall be drilled for adjustable shelf supports with 5mm diameter holes on 32mm (1 1/4") centers.
- D. Front edge shall be banded with 3mm PVC.
- E. Top and bottom edges of upper ends shall be banded with .018" PVC.
- F. All upper cabinets noted to be 12 inches deep to have minimum of 12 inches net inside clear dimension with doors closed.

2.7 FIXED AND ADJUSTABLE SHELVES

- A. Standard Cabinet Shelves: The following materials and thickness shall be used:
 - 1. Shelves at cabinets up to 36" wide shall be 3/4" thick particleboard.
 - a. Provide 1" thick particleboard shelves at all Utility Shelves (US).
 - 2. Shelves at cabinets over 36" up to 41" wide shall be 1" thick particleboard.
 - 3. Shelves at cabinets over 41" up to 48" wide shall be 1 1/8" plywood.
 - 4. Shelves at exposed locations shall be overlaid with high pressure plastic laminate on both faces matching exterior laminates.
 - 5. Shelves at semi-exposed locations shall be overlaid with thermofused melamine on both faces.
 - 6. Front edge shall be banded with 3mm ABS.
- B. Hardboard Shelves: Premium grade, 1/4 - inch tempered hardboard, dark brown color, and supported by adjustable clips or grooved into adjacent members. Edges shall be sanded.

2.8 CABINET BACKS

- A. Semi-exposed backs shall be 1/2 - inch particleboard with factory applied coating to both faces. Interior face to match interior color. Semi-exposed edge shall be banded with .018" PVC.

- B. Exposed or finish backs shall be 11/16" particleboard overlaid with high pressure plastic laminate on both faces to equal 3/4" thickness.
- C. Bottom edge of upper backs shall be banded with .018" ABS.

2.9 PARTITIONS AND DIVIDERS

- A. Vertical partitions at exposed locations shall be 1/2" particleboard overlaid with high pressure plastic laminate on both faces. Exposed faces banded with .018" ABS.
- B. Vertical partitions at semi-exposed locations shall be 1/2" particleboard overlaid with thermofused melamine.
- C. Small dividers shall be premium grade 1/4" tempered hardboard, and supported by adjustable clips or grooved into adjacent members. Edges shall be sanded.

2.10 CABINET BASES

- A. Cabinet bases shall be 4" standard height made in continuous lengths to insure straight, level and true line of casework. Core material to be 3/4- inch exterior grade plywood. Bases to be unfinished and ready for scheduled finish to be applied.

2.11 FILLERS AND SOFFIT PANELS (FP)

- A. Panels shall be made of 11/16" particleboard overlaid with high pressure plastic laminate on both faces to equal 3/4" thick and shall be fitted to adjacent surfaces.
- B. Exposed faces shall have laminate matching adjacent cabinets.

2.12 COUNTERTOPS

- A. Plastic Laminate Countertops (PLCT): GP50 NEMA grade high pressure plastic laminate with .020" backing sheet bonded to 3/4" particleboard substrate, except 3/4" water resistant MDF at countertops with sinks. Adhesives shall be either Type II PVA or contact cement depending on material size and job conditions.
 - 1. Edge: 3 mm PVC at front and return edges, applied after top surface.
 - 2. Backsplash (PLBS): 3/4" thick and 4" high unless otherwise noted on the drawings. Material and color to be the same as countertop. Backsplashes shall be factory assembled with waterproof sealant and #6 x 2" screws at 6" on center.
 - 3. Countertops shall be furnished in longest possible lengths. When joints are required they shall be factory prepared with a minimum of four 1/4" joint bolts each. Joints shall be field assembled with waterproof sealant to insure stable and rigid construction. No joints allowed within 24" of sinks, counter ends, or kneespace areas.

2.13 PLASTIC LAMINATED WINDOW STOOLS (PLWS)

- A. Material: GP50 NEMA grade decorative laminate bonded to 3/4" exterior grade plywood substrate.
- B. Finished Edges and Ends: Shall be trimmed with GP50 decorative laminate applied after top surface. Face thickness shall be as detailed, or 1-1/2" if not detailed.
- C. Lengths: Shall be furnished in longest possible lengths. When joints are required, they shall be factory prepared with a minimum of four 1/4- inch joint bolts each. Joints shall be field assembled with waterproof-sealant to insure stable and rigid construction. No joints allowed within 24 inches of ends of sills.

2.14 HARDWOOD TRIM (HWDT)

- A. Hardwood Trim: Nosings at countertops as shown, premium grade, White Birch. Clear finish by casework manufacturer.

PART 3 - EXECUTION

3.1 FABRICATION, GENERAL

- A. Fabricate casework to dimensions, profiles, and details indicated, with reasonable deviation for manufacturer's standard sizes and modules. Clearly identify all deviations on shop drawings and highlight for Architect's review. Deviations shall not change the design intent and must fully meet all code requirements, including but not limited to handicapped accessibility.
- B. Complete fabrication, including assembly, finishing, and hardware application, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

3.2 EXAMINATION

- A. The installer shall examine the substrate and the temperature and humidity conditions under which the work under this Section is to be performed, and notify the Contractor in writing of unsatisfactory conditions.
- B. Do not proceed with work under this Section until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.3 PREPARATION

- A. Verify the location and fit of all casework. Inform General Contractor of any obstructions or utilities which may be covered by this work. Check floors for level and walls for plumb.

3.4 INSTALLATION

A. General:

1. All work in this Section shall be installed under the control and supervision of the casework manufacturer with factory-trained mechanics in his employ.
2. Conform to governing codes and ordinances for all installation and anchorage requirements.
3. Install all casework to true horizontal and plumb lines, in perfect alignment. Install to a tolerance of 1/8 inch in 8 feet for plumb and level (including tops); and with no variations in flushness of adjoining surfaces.
4. Install cabinets without distortion so that doors and drawers fit openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.
5. Anchor tops securely to base units and other support systems as indicated.
6. Anchor backsplashes and endsplashes securely and set in clear acrylic caulking.
7. Scribe and cut casework to fit adjoining work. Refinish cut surfaces and repair damaged finish at cuts.
8. Fill or cover by approved means all gaps and top of tall and upper cabinet units where they adjoin back and end walls, thus preventing the possibility of paper falling behind these units.

B. Connection of Adjoining Units

1. Where several units are installed in-line, drill through end panels and secure by bolting using "T" nuts, bolts and finishing washers or set bolts with finishing washers, or approved connection system.
2. Countertops shall be continuous over units below unless noted otherwise for specific locations or types of units.

C. Anchorage to Floor

1. Anchor casework with countersunk, concealed fasteners as required for a complete installation. Bolt units for file drawers, and units set out from wall to accommodate piping through bottom and suitably anchor to floor.

D. Window Sills: Anchor securely to sill framing. Caulk space between sills and gypsum board and window frame.

1. Install sills with no more than 1/8 inch in 96 inch sag, bow, or other variation from a straight line.
2. Secure sills with adhesive and fasten as recommended by the sill manufacturer.

E. Attachment, General

1. All casework items shall be securely anchored to building structure, except freestanding, moveable, or mobile units which are to be adjusted to prevent any rocking when sitting on finish floor.
2. Primary anchorage of base and wall cabinets shall be through the cabinet back into wall framing or blocking furnished under other sections. Additional anchorage will be made into cabinet bases and adjacent side walls where they occur. All anchorage to be concealed when doors and drawers are closed. Appropriate sized anchor screws shall

be used to best attach to the existing wall condition which will allow each cabinet to be loaded to a capacity of 50 lb. per sq. ft. of shelf area.

3. All installation shall be in strict conformance with seismic codes.
4. At free-spanning countertops or work surfaces, steel countertop support brackets are to be provided at a maximum spacing of 32 inches, or as shown on the drawings where less. Support brackets are to be designed to allow for knee space clearance and attach to wall framing or blocking for support..

3.5 WORKMANSHIP

- A. Erect casework straight, level, plumb and true.
- B. Neatly scribe casework to walls, soffits and columns. Fillers to color match adjacent surfaces and will not be permitted in excess of 1 ½" wide, unless shown on drawings or approved in advance by the Architect.
- C. Cap off wall and corner scribes to close gaps at top and bottom of cabinets.
- D. Attach countertops securely to base units. Spline and glue joints in countertops; provide concealed mechanical clamping of joint.
- E. Joints are not permitted in continuous countertops over knee spaces or within 24 inches of sinks or counter ends. Joints where approved, are to be tight, in perfect alignment, and not allowing excessive deflection. Seal countertop and/or backsplash to walls.

3.6 COORDINATION

- A. Provide cutting and fitting as necessary to accommodate mechanical work built into casework units.

3.7 ADJUSTING AND CLEANING

- A. Adjust doors, drawers, hardware fitting and other moving or operating parts to function smoothly and correctly.
- B. Clean all work installed in this section. Wipe all surfaces with damp cloth, remove stains, stickers and other foreign matter. Remove from site, all trash, packing material, material scraps and other debris related to the work of this section.
- C. Touch up abraded factory-finished surfaces to match original finish.

3.8 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to Fabricator and Installer which ensures manufactured cabinets and casework being without damage or deterioration at time of Substantial Completion.

END OF SECTION 123550

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1-General Requirements sections, apply to the work specified in this Section.
- B. Bidding and Contracting requirements in Division 00 and General Requirements in Division 01 apply to the work specified in this Section.
 - 1. Base Bid: No theatre seating.
 - 2. Alternate #3: Provide theatre seating as indicated:
 - a. Alternate #3A: Provide and install Irwin seating, as specified herein.
 - b. Alternate #3B: Provide and install Hussey seating, as specified herein.

1.2 SECTION INCLUDES

- A. Work Performed by the Contractor: Auditorium building, including electrical work indicated. Coordination and cooperation with Supplier, Owner and Architect.
- B. Work Performed by the Contractor via the Seating Supplier: Include all labor, material, equipment, transportation, and services to provide submittals, manufacture, furnish, install and make useable the auditorium seating as shown on the drawings and specified herein.

1.3 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete
- B. Division 26 – Electrical: Coordination of electrical components.

1.4 QUALITY ASSURANCE

- A. Vendor / Installer shall be qualified as a “specialist” with regard to fixed, upholstered audience seating systems. “Specialist” is defined as having 5 or more years as a fully trained and professionally experienced construction installer, accustomed to working with other trades for coordination of work. In addition, the Installer shall be certified by the seating manufacturer as fully trained in the particulars of the products which they are installing, and shall have successfully installed not less than (10) similar installations of the product system specified for this project.
- B. All products shall be manufactured in the U.S.A. All products shall be new and unused.
- C. In addition to the requirements of Division 1, proposals for substitute products shall include actual chair samples which are equivalent to the product specified, complete specifications, fabrics, photos, or other product and performance information as requested. Provide a list of recently completed projects in the Pacific Northwest; state the name of the owner and their telephone number.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

- A. All work in this Section shall be in accordance with the current edition of the International Building Code, Uniform Fire Code, and other codes and regulations as applicable or in force. Verify with local authorities for any special requirements. Submit a seating plan to the local authority for review and approval. Verify all aisle widths, egress requirements, and clearances. In case of conflict, notify Architect immediately, in writing.

1.6 PRODUCT HANDLING

- A. Deliver products to job site only after notification that temporary storage is available that is clean, dry and protected from the weather. Containers shall remain sealed tight so as to protect the products until actual installation begins.
- B. Provide protection from damage and soil. Assume responsibility for any and all damage which may occur during transit, storage and prior to acceptance. All material shall be shipped in containers which shall provide adequate protection during shipping and storage. Damaged or unapproved goods which are delivered to the job site shall be removed from the job site; at no additional cost to the Owner.

1.7 SUBMITTALS

- A. General: In addition to the requirements of Section 01 30 00, submit, to cause no delay in the work, shop drawings which show the fabrications and installation requirements of the work. Provide complete product specifications, dimensions, and other data as directed. Provide physical samples of fabrics, materials, colors, finishes, and other data as directed.
- B. Shop Drawings: Prepare a seating plan and section at 1/8" = 1'0" (minimum 1/4" preferred) showing the actual job conditions and field measurements. Show all chair sizes, chair dimensions, mounting methods, anchors, and aisle light locations and connection details. The approximate locations aisle light stub-ups and j-boxes are shown on the Seating Plan. Coordinate this work with the electrical contractor. Deliver to the electrical subcontractor the exact location of all stub-ups; such locations shall be within 1/2" tolerance. Installer shall check the dimensions to verify that the seating plan, with the chair widths shown, will fit the stub-up locations. Architect reserves the right to modify seating plan in order to conform to conditions.
- C. Review: All submittals must be reviewed and approved by the Architect prior to starting work, but such approval does not relieve the Supplier of responsibility for deviations from drawings and specifications. Bring all deviations to attention of the Architect, in writing at time of submittal. After review, submittals will be returned to Contractor.
- D. Configuration of Submittal:
 - 1. The submittal shall incorporate documentary evidence of compliance with the layout on the drawings and all the equipment and installation requirements of the specifications, in a single, comprehensive package. It shall not be acceptable for the Contractor to allow

- the seating fabricator or local installer / dealer to "trickle" in multiple small submittals with or without being requested to do so by the Architect.
2. Specified finish and material samples shall be clearly listed and accompanied by small physical samples which are labeled in reference to the specification section and article where defined. Physical selection samples shall include: Fabric color, armrest color, plastic laminate, steel parts, and other data as directed.
 3. Where the manufacturer's standard literature lists multiple choices for any single item, the item being submitted as meeting the specification requirements shall be appropriately marked, highlighted or otherwise clearly identifying the submitted choice.
 4. Seating layout drawings shall clearly identify all critical dimensions, and if submitted prior to obtaining field verified dimensions, shall indicate in large bold print, that the layout is prior to field confirmation, and that the Contractor is responsible for obtaining confirmed field dimensions and re-submitting the ENTIRE submittal package with all corrections from the prior review(s) incorporated and highlighted, along with a new seating layout plan that shows verified dimensions and any changes to the seating layout or size mix, with updated Seat Count Table, also highlighted.
- E. Failure to notice deviations from the contract documents, when submittals have been reviewed by the Architect or Consultant, is not a waiver of the contract document requirements for the items in question. The contract documents shall prevail. Deviations on the submittals shall only be permissible if intentionally acknowledge and directed by the Architect and/or Consultant on the submittal.
- F. Claim for Extras: No claim for extras may be based on work shown on shop drawings which deviates from the contract documents.

1.8 RESPONSIBILITY

- A. The Contractor is solely responsible for compliance with the requirements of the drawings and specifications and the proper design, manufacture, delivery, construction coordination with work of other trades, protection, installation and worker safety for the work of this section. Contractor shall advise the Architect of any discrepancy in, or disagreement with the specifications and/or drawings prior to starting work and not proceed until issue is resolved. Contractor shall use fabricators and seating installers who are fully experienced and entirely knowledgeable to perform the work specified herein. Commencement of work shall indicate Contractor's acknowledgment of his fabricator and installer's mutual expertise in this type of work. Any delay resulting from failure to comply with this procedure will not be basis for an extension of the completion date or additional compensation.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Chair Widths: Furnish and install as and where shown or directed. Design is based on a 21" wide seat as the standard, with 22", and 20" widths allowed (in preference order) as first choice for aligning ends of rows and creating sightline offsets. Nineteen inch (19") wide chairs may be used only as shown on the TS drawings, or with approval of the Architect and Theater Consultant, when no other seating size combination will provide proper alignment.

- B. All Chairs: Self-rising by spring-assist, with maximum depth not to exceed 20.5" with the seat in the 75% "full lift" position. Seat shall rise to 75% full lift without human intervention or assistance. All chairs shall have minimum 3-position, adjustable back pitch, with lean back angle selectable between 13 and 19 degrees. Demountable components shall be accessible for servicing and reupholstering, without special tools or knowledge. Seat rise stops shall be extremely quiet when allowed to flip up without assistance or restraint.
- C. Surfaces and Edges: Smooth and free from burrs or sharp edges. Fasteners to be concealed or smooth surfaced.
- D. Fasteners: Provide all the necessary fasteners as recommended by the manufacturer for the complete assembling, mounting, and installation, including anchor bolts for the chair standards on concrete floor slab and risers. Floor mounted chairs shall use steel "acorn cap" nuts and shim washers so that when seat is firmly anchored, there shall be no exposed threads above the nut. An acceptable alternative shall be provision at each chair standard, a durable, protective, decorative foot cap in same finish color as chair standard.
- E. Auditorium chairs shall be provided which display a continuity of design, and all components shall complement one another in form, style and texture, thereby evincing a contemporary, timely appearance of the completed auditorium. Comfort shall be of prime importance in the design of the chair components, and design shall be based on nationally recognized studies of human form and dimensions. Human engineering and ergonomics shall dictate contours and details of support structure in the components.
- F. The face of the seat and the face of the back shall be upholstered; the rear-of-the-back shall be solid wood and the seat shell bottom shall be injection molded plastic / polymer.
- G. Aisle Seat End Standards: Aisle standards designated on the contract drawings shall be designed to allow an individual to transfer from a wheelchair to the theatre chair without sacrificing decorative details of the aisle standards. The aisle panels, with associated armrest, shall be arranged to swing rearward, creating sideways access to the chair. Manual release of the swing-away decorative panel shall be readily accessible under the armrest, and return of the swing-away decorative panel shall self-latch. Aisle standards so equipped shall be provided with a permanently affixed, durable label, displaying an easily recognizable "handicapped" symbol. Seats marked on drawings as Handicapped Access shall accept Aisle lighting fixtures recessed in the armrest position. Handicapped Access Aisle seats shall have decorative end panel and shall be aesthetically balanced in appearance to those seat that do have the end panel.
- H. Armrests shall be solid hardwood with all edges well rounded and smooth, with no rough ridges or sharp edges. Center and aisle armrest shape style shall be "comfort-curved" as defined by Irwin Seating, or acceptable equivalent by other approved manufacturers. Finish pigment shall be as selected by Architect, from manufacturer's standard available finishes. Armrests shall be furnished with two (2) keyhole slots in the bottom and shall lock securely to dovetail lugs provided on aisle and center standards.
- I. A numbering system shall be provided for identification of all chairs. Number and letter plates shall be furnished as shown on the approved seating layout, and shall be metal, approximately 5/8" x 1-5/8" with a bronze finish and black Helvetica Medium letters and numerals. The seat pans shall be recessed at the center of the front edge for the number plates, and the plates shall be attached by two (2) pop rivets. Letter plates shall be attached to the aisle panels below

the recessed lighting by two (2) escutcheon pins. Attaching hardware shall have a bronze finish compatible to plates and shall be finished smooth, so as to not snag apparel or injure occupant.

1. Donor Plates: Provide 2-1/2"x7/8" clear aluminum adhesive donor plate (not engraved) for each chair.
- J. Aisle lights shall be furnished for the aisle standards located as designated on the seating drawings in the contract documents.
1. Aisle lights shall be concealed style, low voltage, non-hazardous, 12V, D.C. system, utilizing a minimum of 6 miniature LED light elements per standard, and providing adequate illumination for floor and/or steps adjacent to aisle standards. Seating manufacturer shall provide an aisle lighting fixture as a part of the aisle end chairs which, when set in locations per the seating drawings, will meet the code minimum requirements in the jurisdiction of the project for non-emergency egress illumination. Color of LED aisle light shall be Warm White, at approximately between 2700K and 2900 K correlated color temperature, with all LED's from the same binning batch within a 3-step group.
 2. The light assembly shall be concealed in the aisle armrest, with wiring concealed from sight and protected from damage. On Handicapped Access swing away aisle panel positions, the concealed aisle light shall be concealed in the armrest.
 3. The standard shall be completely pre-wired with not less than 36" of black, split loom plastic conduit flexible wiring extending beyond the bottom of the platform/standard, in addition to any wiring that must be run in or on the standard. Wiring shall be concealed within the body of the steel end standard, or with cast-iron standards, neatly run and anchored tight to the standard and end panel, out of view and tampering reach to the maximum extent possible. The protective flex enclosure shall be as small as is practical, finished to not be noticeable, and shall stay tight to the standard until immediately above the anchor foot, whereupon it will exit laterally near the floor.
 4. Seating supplier shall furnish as part of the aisle light package, multiple filtered, regulated voltage reduction devices specifically designed to serve LED loads in an environment where irregular voltage conditions may exist, suitably housed in a NEMA 1 steel safety enclosure and shall be equipped with primary and secondary fuses, terminal blocks, and safety disconnect; all components Underwriters' Laboratories listed, and assembled by licensed electricians to N.E.C. specifications, to facilitate safe connection to the building electrical system. All wiring connections from the electric distribution system to the aisle light standards, as well as installation, proper safe mounting and connection of the voltage reduction driver devices, shall be covered under the scope of Division 26, including provision of suitable locking-style electrical disconnect device.
 5. Selection of rectangular or round form of the aisle light shall be directed by the Architect, depending on style of aisle end panel, and shall be marked on the submittals.
 6. Acceptable manufacturer / product is the Vista "Linear Krystal-Lite (LKL)"
 7. Mobile base "de-mountable" chairs (if used on this project) shall not receive aisle lighting.
- K. Fabric, Plastics, Paint and Stain Finishes
1. Not all finish options listed below may be included in the chairs as specified in detail later in this section of the specifications.
 2. Upholstery Fabric: Shall be Momentum and pattern shall be as selected by Architect, or another equivalent grade standard fabric as approved by Architect.
 - a. Momentum "Synergy".
 - b. Color: Carbon.
 - c. Finish: Crypton Green
 - d. Flame Resistance: CA Bulletin 117 2013

- e. Durability: 165,000 rubs.
 - 3. Injection molded polypropylene or nylon: Shall be pigmented, in color selected by Architect, and have a dull, slightly textured surface.
 - 4. Plastic Laminate: Shall meet requirements NEMA LD 3, Grade VGS for vertical surfaces and Grade HGS for horizontal surfaces. Color and pattern to be chosen by Architect, from manufacturer's standard offering.
 - 5. Steel Parts: shall be provided with a hybrid epoxy powder coat in one of the manufacturer's standard colors. Finish treatment will be done using the following procedure:
 - a. Pre-powder coat cleaning in a 7-stage bonderizing process
 - 1) 1st stage: acid clean
 - 2) 2nd stage: water rinse
 - 3) 3rd stage: zirconium immersion
 - 4) 4th stage: deionized water rinse
 - 5) 5th stage: seal spray
 - 6) 6th stage: deionized water rinse
 - 7) 7th stage: deionized water rinse
 - 8) parts pass thru a dry off oven
 - b. Powder coat finishing of parts in an electrostatic system.
 - 1) Parts shall be coated with a thermosetting epoxy powder.
 - 2) Cured powder coat to have dry film thickness of 1.0 to 2.0 mils.
 - 3) Parts shall be high temperature cured in a gas fired convection oven.
 - 4) Cured powder coat must pass; ASTM D3363-74 Hardness 2H, ASTM D2794-69 Impact Resistance 120 in-lbs without cracking, ASTM D522-60 Flexibility no cracking or loss of adhesion, ASTM B117-73 Salt Spray 144 hours with no corrosion, ASTM D1654-79a Salt Spray maximum 1/8" creep from scribe line, ASTM D3359-83 Adhesion 5B, ASTM G53-96 Light Resistance 48 hour exposure with no chalking, 75% gloss retention and color change less than 1.5 deltaE CIE and Hoffman Scratch Hardness Tester no substrate appearance with 1,000 gram load.
 - 6. Finish colors for leg standards and seat pans (only if steel) shall be a powder coat, selected by Architect from manufacturer's complete range of available standard finishes.
- 2.2 ACCEPTABLE PRODUCTS: For Alternate #3: Theatre Seating, the following specific product system by Irwin Seating (defined in article 2.3) is the "Basis of Design". Products by Hussey Seating (defined in article 2.4) shall be considered as equally acceptable.
- 2.3 Alternate #3A: Irwin Seating – "ANDANTE" #37.12.86.4
- A. Chair Back - #37
- 1. Chair back components shall be padded and upholstered back with tombstone shape. Backs shall feature an upholstered cover and an ergonomic, compound curved structure. Assembled chairs shall have a nominal back height of 34". The back assembly shall be certified through routine ISO testing to withstand a 250 lb. static load test applied approximately 16" above the seat assembly and a 100,000 cycle 40 lb. swing impact test.

2. Seatback mounting wings shall allow for (3) seatback angles, from 13 deg to 19 deg. Set the leanback angle of front segment of seating at 19 degrees. Set the leanback angle of rear segment of seating at 13 degrees.
3. The upholstery panels shall be 7/16" 5-ply hardwood plywood formed with compound curves for proper body support. Panels are to be padded with not less than 2" thick polyurethane foam and covered with an upholstery fabric cover. Wings used for the attachment of the complete back assembly to the standards shall be not less than 14 gauge (.0747") steel. Wings shall be firmly secured to the inner panel through the use of threaded t-nuts fastened to the inner panel.
4. The rear back panel shall be constructed of 9-ply thick hardwood, formed to enclose the edges of the inner upholstery panel at the top and both sides of the back; and shall be not less than 29" in length, extending below the seat level to protect the seat cushion from the rear. There shall be no exposed fasteners (concealed).

B. Seat Assembly - #12 Loge

1. Quiet-rise seat, self-lifting by spring-assist to 75% vertical without human assistance.
2. Seat pan shell bottom shall be injection molded plastic / polymer.
3. Injection molded, glass-filled polyethylene foundation with curved, thermoplastic resin panel as an ergonomic substrate.
4. 3" seat foam; molded polyurethane.
5. Upholstery fabric shall match fabric on face of seat back

C. Aisle End Panel - #86 "Keystone"

1. Aisle end panels shall be keystone-shaped with block front aisle end panel, constructed of medium density fiberboard (MDF) and surfaced with wood veneer specified and a lacquered edge to match the dominant color of the wood seatback and armrest. Panels shall be provided with a seat bracket recess for precise location and support of the panel. Panel is secured to a 14 gauge formed steel bracket bolted to the top of the support column and directly to the support column with the use of a spacer. Panel bracket assembly is concealed behind a steel shroud attached with a tamper resistant screw.
2. Shall accommodate armrest as specified herein.
3. Shall accommodate specially fit LED fixture as specified herein and as shown on TS series drawings.
4. Shall accommodate ADA swing away panel as specified herein and as shown on TS series drawings.

D. Chair Platform / Standards - #4

1. Chair support columns shall be a formed 14 gauge (.0747") steel tube with an integral back wing plate. Column shall exhibit a 10 deg rearward incline to help conceal back attachment hardware. Brackets for seat attachment shall be 7 gauge (.1875") steel for superior strength, formed with an integral support buttress. Floor attachment foot shall be formed from 12 gauge (.105) steel to 7-1/2" x 2-5/8" in size. All steel components shall be robotic welded for precise assembly and exceptional integrity. Foot-to-column welds are to be concealed on the inside of the foot for a clean appearance. The standard shall be fabricated to be compatible with the floor incline, and to maintain proper seat and back height and angle.

2.4 Alternate #3B: Hussey Seating "Quattro Designer" Series

A. Chair Back

1. The outer back panel shall be constructed of soft square wood veneer. The panel shall be no less than 36" in length and conceal the rear and sides of the upholstered inner panel. The panel shall extend below the rear of the seat to protect the chair occupant's back.
2. The inner upholstered panel shall be 5/8" (15mm) 11 ply thick-formed hardwood with an ergonomically engineered contour. The wings for attachment of chair back to standard shall be not less than 14 ga. (1.9mm) and will be attached via concealed fasteners. Wings shall position the chair back at one of three positions: 15, 18, or 21 degrees. There shall be no exposed fasteners above the seat. Chair back upholstery shall exhibit a high degree of workmanship and customization.
3. Soft Square - 36": The top corners of the back are conically shaped for stylish looks and a timeless appearance. Overall back height is 36" above the floor allowing proper shoulder support of the chair occupant. The back surface shall be contoured to facilitate proper posture of a seated individual.
4. Back foam shall be not less than 2" thick, with upholstery fabric tailored in Waterfall style.

B. Seat Assembly

1. The seat assembly shall consist of a stylish padded and upholstered top surface, a polypropylene bottom shell with dual contours, and a dual sprung lifting mechanism to assist gravity. Seat shall have the ability to achieve a 75% full lift position by itself, without human assistance. Superior comfort shall be derived through careful ergonomic engineering.
2. Upholstery Pad: The upholstered seat topper shall consist of a 5/8" thick formed ply form base with contoured molded polyurethane foam padding and fabric upholstered cover. Seat padding shall be properly contoured to support the body without causing discomfort. The upholstered seat cover shall exhibit a high degree of tailoring and will be affixed to the base with upholstery staples. Support foam shall be PLUSH dual density, waterfall style.
3. Seat Mechanism: Seat lifting mechanism shall use lubricated lifting springs to provide whisper quiet fail-safe operation. The seat structure shall rotate on a 3/4" [19mm] spanner bar to assure shaft alignment and eliminate binding due to irregular floor conditions. Seats shall be certified to withstand 350,000 lifting cycles and a 600lb static load without failure.
4. Seat hinges shall be fully contained within the seat pan and fitted with a pair of independent nylon bushings. Seat hinge and spring installation shall be designed not to require periodic adjustment or lubrication. Each of the independent seat hinges shall be fitted with double acting; self-centering, pre-loaded coiled seat return spring.

C. Aisle Panel

1. Decorator panel constructed from 45 lb MDF. Panel shall be surface with wood veneer end panels. Panel to be 3/4" with minimum 1-1/2" thickened edge.
2. Shall accommodate armrest matching seat at interior of rows. Shall accommodate high mount recessed aisle light at locations shown on drawings.
3. Aisle panel shall be securely mounted to end standard platform frame, with no wiggle or vibration.

4. Designated aisle seats shall not have aisle end panel but shall have swing away end panels and other elements as specified herein.
5. Shall accommodate wood armrest; Birch Natural finish or as specified herein.
6. Shall accommodate specially fit LED fixture as specified herein and as shown on TS series drawings.
7. Shall accommodate ADA swing away panel as specified herein and as shown on TS series drawings.

D. Chair Platform

1. Standards shall be 1" [25mm] x 3" [76mm] x 16 gauge [1.5mm] seamless oval mechanical steel tubing. Standards utilizing an open seam (not welded) shall be considered unacceptable.
2. The top of the standard shall provide for vandal resistant attachment of the armrest, without the use of exposed fasteners on the surface of the arm.
3. Floor mounted standards shall have a 14 gauge [1.9mm] formed steel foot. The formed foot shall be full perimeter welded to the upright tubular member. The floor mount standards shall be manufactured to match floor inclines in order to maintain proper seat height and angle.

PART 3 - EXECUTION

3.1 GENERAL

- A. Do not begin manufacturing before submittals and materials samples have been reviewed and approved by the Architect. In case of discrepancies, notify Architect immediately.
- B. Installation shall follow Seating Plan as shown or directed. Architect reserves the right to make reasonable changes or modifications. Field verify all dimensions and report findings to Architect.

3.2 EXAMINATION

- A. Examine site conditions and substrates under which the chairs are to be installed; notify Architect of conditions which are detrimental to the proper and timely completion. Do not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the Architect. Verify all building and chair dimensions prior to submittal of shop drawings.
- B. The fixed chairs will be floor-mounted to a flat concrete floor slab which steps up per each row. Chair arc seline shall account for variations in riser height at different locations in room, and maintain the closest horizontal distance possible between seat outerback and the vertical riser face behind the chair. Allow only enough gap to prevent contact between chair outerback and riser/tread intersection when a 250 lb person applies their weight laterally against the front side of the chair back. Gap between chair outerback and riser/tread edge shall not exceed 3 inches.

3.3 INSTALLATION

- A. Begin work only when directed and after all finishes, except carpet, in auditorium have been applied and completed. Do not uncrate materials until all dirt and dust-causing activities are complete.
- B. Install chairs with a minimum of two anchors per standard in concrete substrate, with length and diameter as required for permanent, rigid installation. Indicate size and type of anchor at time of submittal.
- C. Adjust seat backs to correct pitch, with center position slope at main level and forward position slope at balcony. All backs and seat pans in same row to be in alignment with one another and evenly matched. Seats shall rise automatically, quietly and without binding. Touch-up paint on all metal surfaces where damaged.
- D. Chairs shall be installed so that no rows shall deviate beyond 1.5" total (+ and - combined) from a perfect endline along all row ends at all aisles. Use of wide chairs to achieve alignment, such that seat count total is diminished in excess of (4) chairs total is not acceptable.
- E. Chairs on arc-lines to a radius shall be concentric row-to-row, and when viewed from any direction shall have their seatback tops and arms appears visually uniform across the sweep of arc, with no seatback or armrest appearing canted, tipped or at a different height above the reference floor level of the other seats in the same arc-line.
- F. The seats shall operate quietly during all modes of use, including, but not limited to:
 - 1. During lowering of the seat and initial sit-down of the occupant.
 - 2. When the occupant moves or shifts position while seated.
 - 3. When the occupant stands and the seat rises automatically.
 - 4. "Quietly" shall be defined as the absence of any audible noise which, in the opinion of the Architect or the Acoustical Consultant, is objectionable. All seats will be tested after installation is complete, and any seat producing objectionable noise must be corrected or replaced at no cost to the Owner. The above requirements are applicable for entire Warranty period.
- G. Incorrect work to be redone at no extra cost, as directed. The architect shall be the judge as to what is correct.
- H. Notify electrician for electrical service connection. Cooperate and provide assistance where necessary.
- I. Protect chairs from damage, dirt, dust and soiling prior to acceptance. All chairs shall be clean at time of acceptance. Should the chairs accumulate any dirt, dust or soil prior to acceptance, then the chairs (all of them) shall be vacuumed and wiped clean. Any chairs with stains, dirt/dust impregnation or other damage that cannot be fully removed to new status shall be replaced with new at no additional cost.

3.4 SPARE PARTS / ATTIC STOCK

- A. Provide the following minimum complement of spare parts as attic stock, turned over to Owner in appropriate protective containers (See A-1 below) with a detailed inventory:

1. All spare parts to be stored in appropriately sized clear protective containers. Provide Uline Clear Industrial Totes, Model Nos S-11865, S-11866 or S-12679. Provide multiple containers if necessary; include detailed inventory for each container.
 - a. Extra made-up seat covers, in the amount of five percent (5%) of the total quantity of chairs in proportionate widths.
 - b. Extra upholstery fabric in the amount of not less than twenty (20) uncut yards.
 - c. LED tubes replacements for aisle light fixtures; twenty (20).
 - d. Extra matching wood armrests, (20), with fasteners.
 - e. Anchor bolts, fifty (50) of each size and type.
 - f. Touch up finish paint for cast iron and steel finishes; not less than 4 oz per color.

3.5 WARRANTY

- A. Provide as set forth in Division 01.
- B. In addition to the above, warranty the moving parts of the seat, including the hinge mechanism and seat springs, for 5 years. Refer to Division 01 for the start of the warranty period.

3.6 CLOSE OUT

- A. Provide "as-built" seating plan, 1/4" scale, delivered to Architect; include catalog data and replacement parts list. Refer to Division 01 for general requirements
- B. Provide instruction manuals which clearly define periodic maintenance service required, and demonstrate how to disassemble and re-assemble a chair unit to replace or service any and all components. Coordinate with Division 01 for general requirements.
- C. Provide certificate of flame-retardant upholstery fabric and cushion material.
- D. Provide not less than (2) hours of training, familiarization and orientation to Owner's designated representative. Obtain sign-off sheet from training participants, affirming satisfactory presentation and understanding of training. Submit original copy of signoff sheet with bound manuals.
- E. Notify Architect for final inspection.
- F. Perform punchlist adjustments, corrections and completions in a timely manner per contract document requirements.

3.7 FOLLOW-UP

- A. Nine months after project is completed and Owner has occupied for use, return to the site and re-tighten all anchor bolts into floor. During same visit, inspect each seat for any loosening or premature wear, and make repairs as needed to restore to proper, original installation condition. This work shall be performed without additional cost for materials or labor.

END OF SECTION 126113

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 pre-engineered hydraulic passenger elevators.
- B. Key Abbreviations include the following:
 - 1. ELEV Elevator
- C. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 - 2. Section 051200 "Structural Steel Framing" for attachment plates, angle brackets, and other structural-steel preparations for fastening guide-rail brackets.
 - 3. Section 051200 "Structural Steel Framing" for hoist beams.
 - 4. Section 055000 "Metal Fabrications" for attachment plates and angle brackets for supporting guide-rail brackets, Structural-steel shapes for subsills, pit ladders, and hoist beam.
 - 5. Section 096816 "Sheet Carpeting" for finish flooring in elevator cars.
 - 6. Division 22 Sections for sump and oil interceptor.
 - 7. Division 23 Sections for ventilating of machine room.
 - 8. Division 26 Sections for telephone service to elevators.
 - 9. Division 26 Sections for providing electrical service to elevator, including fused disconnect switches, standby power source, transfer switch, and connection from auxiliary contacts in transfer switch to controller.
 - 10. Division 26 Sections for Heat and smoke sensing devises.
 - 11. Division 26 Sections for convenience outlets and illumination in machine room, hoistway and pit.
- D. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Section 300 for hydraulic elevators. State or local requirements must be used if more stringent.
 - 1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
 - 2. Supply in ample time for installation by other trades: inserts, anchors, bearing plates, brackets, supports and bracing, including all setting templates and diagrams for placement.
 - 3. Hoistway shall be clear and plumb with variations not to exceed $\frac{1}{2}$ " at any point.

4. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
5. Pit floor shall be level and free of debris.
6. Machine Room temperature must be maintained between 55- and 90-degrees F.
7. If Machine Room is remote from elevator hoistway, clear access must be available above the ceiling or metal/concrete raceways installed in floor for oil line and wiring duct between the two spaces.
8. Access to all machinery shall be in accordance with the governing authority or code.
9. Furnish and install finished flooring in the elevator cab.
10. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult with elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
11. Where sheetrock construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
12. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
13. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
14. Elevator sill supports shall be provided at each opening.
15. All walls and sill supports must be plumb where openings occur.
16. For applications with jack hole, free and clear access to the elevator pit area for the jack hole-drilling rig is required.
17. Where jack hole is required, remove all spoils from jack hole drilling.
18. When not provided by the elevator contractor, jack hole shall accommodate the jack unit. If required, the jack hole is to be provided in strict accordance with the elevator contractor's shop drawings.
19. Locate a light fixture and convenience outlet in pit with switch locate adjacent to the access door.
20. A light switch and fused disconnect switch for each elevator should be located inside the machine room adjacent to the door, where practical, per the National Electrical Code (NFPA No. 70).
21. As indicated by the elevator contractor, provide a light outlet for each elevator, in center of hoistway.
22. For signal systems and power operated door; provide ground and branch wiring circuits, including main line switch. For car light and fan, provide a feeder and branch wiring circuits, including main line switch.
23. Wall thickness may increase when fixtures are mounted in drywall. These requirements must be coordinated between the general contractor and the elevator contractor.
24. Provide supports, patching and recess to accommodate hall button boxes, signal fixtures, etc.
25. Locate telephone and convenience outlet on control panel.

1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures; hoistway entrances; and operation, control, and signal systems.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and large-scale details indicating service at each landing; machine room layout; coordination with building structure; relationships with other construction; and locations of equipment.
 - 2. Include large-scale layout of car-control station.
 - 3. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Samples for Initial Selection: For finishes involving color selection.
- D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes, 3-inch-square Samples of sheet materials and 4-inch lengths of running trim members.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Manufacturer Certificates: Signed by elevator manufacturer, certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals. Include the following:
 - 1. Owner's Manual and Wiring Diagrams.
 - 2. Parts List with recommended parts inventory.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.
- B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions of the following:

1. ASME A17.1, "Safety Code for Elevators and Escalators", latest edition or as required by the local building code.
 2. Seismic Risk Zone: Project is located in Zone 03 or greater.
 3. Chapter 296-96 "Safety Regulations and Fees for all Elevators, Dumbwaiters, Escalators and other Conveyances" of the WAC.
 4. Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."
- C. Fire-rated Entrance Assemblies: Opening protective assemblies including frames, hardware and operation shall comply with ASTM E2074, and NFPA Standard 80. Provide entrance assembly units bearing a Class B label.
- D. Inspection and Testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits, and fees for elevator installation.
1. Arrange for inspections and make required tests.
 2. Include the cost to coordinate and attend two final inspections by elevator inspector.
 3. Deliver to the Owner upon completion and acceptance of elevator work.

1.8 COORDINATION

- A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work specified in other Sections that relates to hydraulic elevators, including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

1.9 PROJECT CONDITIONS

- A. Prohibited Use: Elevator shall not be used for any purpose during the construction period before substantial completion of the project.

1.10 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 2. Warranty Period: One year from date of Project Substantial Completion.

1.11 MAINTENANCE

- A. Furnish normal working hour maintenance and call back service for a period of 12 months from date of Project Substantial Completion. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning supplies and parts to keep the elevator(s) in proper operation.

PART 2 - PRODUCTS

2.1 HYDRAULIC ELEVATOR MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide ThyssenKrupp Elevator; Endura Above-Ground two-stage, or a comparable product by one of the following:
1. Otis Elevator Co.
- B. Source Limitations: Major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer

2.2 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description:
1. Type: Twinpost (Holeless), telescoping, two-stage.
 2. Rated Load: 3000 lb.
 3. Rated Speed: 80 fpm. minimum.
 4. Stops: Two.
 5. Operation System: Single automatic operation.
 6. Power Characteristics: 208volts, 3 phase, 60Hz.
 7. Auxiliary Operations: Battery-powered lowering.
 8. Security Features: Keyswitch operation.
 9. Car Enclosures:
 - a. Inside Width: 80 inches from side wall to side wall.
 - b. Inside Depth: 57 inches from back wall to front wall.
 - c. Inside Height: Not less than 88 inches to underside of ceiling.
 - d. Front Walls (Return Panels): Satin stainless steel, No. 4 finish with integral car door frames.
 - e. Car Fixtures: Satin stainless steel, No. 4 finish, vandal resistant.
 - f. Side and Rear Wall Panels: Plastic laminate tklp.
 - g. Door Faces (Interior): Satin stainless steel, No. 4 finish.
 - h. Door Sills: Extruded aluminum with grooved surface, 1/4 inch thick
 - i. Handrails: 1-1/2" cylindrical satin stainless steel, No. 4 finish, at sides and rear of car.

- j. Subfloor: Exterior, underlayment-grade plywood, not less than 5/8-inch nominal thickness
 - k. Floor prepared to receive resilient flooring (specified in Section 096516 "Resilient Sheet Flooring").
 - l. Luminous ceiling. LED light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
 - m. Light Fixture Efficiency: Not less than 35 lumens/W.
 - n. Ventilation Fan Efficiency: Not less than 3.0 cfm/W.
10. Hoistway Entrances: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
- a. Fire Rating: Provide fire-rated door assembly as required to meet code requirements
 - b. Width: 42 inches.
 - c. Height: 84 inches.
 - d. Type: Single-speed side sliding.
 - e. Frames: Satin stainless steel, No. 4 finish.
 - f. Doors: Satin stainless steel, No. 4 finish.
 - g. Sills: Aluminum.
11. Hall Fixtures: Satin stainless steel, No. 4 finish, vandal resistant.
12. Additional Requirements:
- a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.

2.3 SYSTEMS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.
 - B. Hydraulic Machines and Elevator Equipment: Provide hydraulic plunger-cylinder units of type indicated below, with electric pump-tank-control system equipment in machine room as indicated.
 - C. Hydraulic Machines: Twin post holeless telescopic two-stage.
 - D. Hydraulic Silencers: System shall have hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
 - E. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
1. Casing for Underground Piping: Schedule 40 PVC pipe complying with ASTM D 1785, joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.

- F. Hydraulic Fluid: Nontoxic, biodegradable fluid, made from vegetable oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives, that is approved by elevator manufacturer for use with elevator equipment.
- G. Car Frame and Platform: Welded or bolted steel units.

2.4 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation system as required to provide type of operation indicated.
 - 1. Single Elevator: Provide "selective collective automatic operation" as defined in ASME A17.1.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated.
 - 1. Single-Car Battery-Powered Lowering: When power fails, car is lowered to the lowest floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
- C. Security Features: In addition to above operational features, provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
 - 1. Keyswitch Operation:
 - a. Hall push buttons are activated and deactivated by security keyswitches.
 - b. All switches shall be cylinder type, designed to accommodate lock cores provided under Section 087100 "Door Hardware."
 - 2. Main Egress/Fire Recall
 - a. Primary fire recall floor is the Lower Floor Level.
 - b. Alternate fire recall floor is the Upper Floor Level.

2.5 SIGNAL EQUIPMENT

- A. General: Provide signal equipment for elevator with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, non-yellowing translucent plastic.
- B. Car Control Stations: Provide fully recessed car control stations with applied metal faceplates. Mount in return panel adjacent to car door, if not otherwise indicated.
 - 1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.
 - 2. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.

3. Mount controls at heights complying with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)."
- C. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
1. Monitoring of the Emergency Communication System shall be included in the Maintenance Service specified above for one year after Substantial Completion at no additional cost to.
 2. Two-way intercom with auto dialer to area outside of hoistway for emergency communication.
 - a. Coordinate with Division 10 Section "Signage" to provide text and graphics for directions complying with IBC Section 1007.8.2 and instructional signage complying with IBC Section 1007.11
 3. Hands-off telephone with push button auto dialer and audio communication system for hook-up to 24 hour answering service.
 4. All equipment and component parts of the Emergency Communication System installed, supplied or provided shall be the manufacturer's non-proprietary equipment or shall be manufactured and distributed by a third-party, non-installer company servicing the vertical transportation industry.
 5. Equipment and components shall not employ any proprietary designs that could hamper and/or otherwise prohibit subsequent maintenance repairs or adjustments by all qualified contractors.
 6. Manufacturers of the new apparatus shall provide parts replacements on the open market to all maintenance providers for the equipment and component systems for a minimum of ten (10) years to ensure the apparatus or systems remain maintainable regardless of who may be selected for future service.
 7. If any part delivered or installed on the unit incorporates computer software, owner agrees that the transaction is not a sale of such software but a license to use such software solely for operating the units for which such part was provided. Owner agrees to keep such software in confidence as a trade secret for Contractor.
- D. Two-Way Intercom Communication Service: Provide two-way intercom communication between elevator car and elevator machine room (Room 1215) including flush-mounted cabinet in each car and required conductors in traveling cable for firefighters' two-way telephone communication service. Provide wall mounted intercom in machine room. Include all conduit, wiring, communication equipment and labor to provide a fully functioning two-way communication system in compliance with Washington Administrative Code WAC 296-90-02456(10).
- E. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

1. Include travel direction arrows if not provided in car control station.
- F. Hall Push-Button Stations: Provide hall push-button stations at each landing with key lockout as indicated.
1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 2. Provide units with direction-indicating buttons; two buttons at intermediate landings; one button at terminal landings.

2.6 DOOR REOPENING DEVICES

- A. Door Edge Device: Provide retractable edge shoes on elevator entrance doors that cause doors to stop and reopen upon contacting an obstruction. Include photoelectric device with timed cutout that projects dual-light beams across car entrance at 5- and 29-inch heights; the beams, when interrupted, cause doors to stop and reopen.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between cylinder and pit floor with 4-inches of nonshrink, nonmetallic grout.
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- D. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cemented fittings.
1. Excavate for piping and backfill encased piping according to applicable requirements in Section 312000 "Earth Moving."

- E. Lubricate operating parts of systems as recommended by manufacturers.
- F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- G. Leveling Tolerance: 1/4 inch, up or down, regardless of load and travel direction.
- H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- I. Locate hall signal equipment for elevators as follows unless otherwise indicated:
 - 1. Place hall lanterns either above or beside each hoistway entrance.
 - 2. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.4 PROTECTION

- A. Temporary Use: Do not use elevator for construction purposes.

3.5 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Check operation of elevator with Owner's personnel present before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

END OF SECTION 142400