PROJECT MANUAL

TASMG Readiness Center
AVCRAD Facility
Springfield, Missouri

Volume 2 of 4

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Kansas City, MO 64116

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PROJECT NO.: T1809-01

FOR: State of Missouri
Office of Administration
Division of Facilities Management,
Design and Construction
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>TITLE</th>
<th>NUMBER OF PAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VOLUME 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DIVISION 00 – PROCUREMENT AND CONTRACTING INFORMATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>000000</td>
<td>INTRODUCTORY INFORMATION</td>
<td></td>
</tr>
<tr>
<td>000101</td>
<td>Project Manual Cover</td>
<td>1</td>
</tr>
<tr>
<td>000107</td>
<td>Professional Seals and Certifications</td>
<td>5</td>
</tr>
<tr>
<td>000110</td>
<td>Table of Contents</td>
<td>5</td>
</tr>
<tr>
<td>000115</td>
<td>List of Drawings</td>
<td>5</td>
</tr>
<tr>
<td>001116</td>
<td>INVITATION FOR BID (IFB) plus Missouri Buys instructions and special notice</td>
<td>3</td>
</tr>
<tr>
<td>002113</td>
<td>INSTRUCTIONS TO BIDDERS (Includes MBE/WBE/SDVE Information)</td>
<td>8</td>
</tr>
<tr>
<td>003132</td>
<td>Geotechnical Data</td>
<td>1</td>
</tr>
<tr>
<td>003144</td>
<td>MBE/WBE/SDVE Directory</td>
<td>1</td>
</tr>
<tr>
<td><strong>The following documents may be found on MissouriBUYS at <a href="https://missouribuys.mo.gov/">https://missouribuys.mo.gov/</a></strong></td>
<td></td>
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</tr>
<tr>
<td>004000</td>
<td>PROCUREMENT FORMS &amp; SUPPLEMENTS</td>
<td></td>
</tr>
<tr>
<td>004113</td>
<td>Bid Form</td>
<td>*</td>
</tr>
<tr>
<td>004336</td>
<td>Proposed Subcontractors Form</td>
<td>*</td>
</tr>
<tr>
<td>004337</td>
<td>MBE/WBE/SDVE Compliance Evaluation Form</td>
<td>*</td>
</tr>
<tr>
<td>004338</td>
<td>MBE/WBE/SDVE Eligibility Determination Form for Joint Ventures</td>
<td>*</td>
</tr>
<tr>
<td>004339</td>
<td>MBE/WBE/SDVE Good Faith Effort (GFE) Determination Forms</td>
<td>*</td>
</tr>
<tr>
<td>004340</td>
<td>SDVE Business Form</td>
<td>*</td>
</tr>
<tr>
<td>004541</td>
<td>Affidavit of Work Authorization</td>
<td>*</td>
</tr>
<tr>
<td>005000</td>
<td>CONTRACTING FORMS AND SUPPLEMENTS</td>
<td></td>
</tr>
<tr>
<td>005213</td>
<td>Construction Contract</td>
<td>3</td>
</tr>
<tr>
<td>005414</td>
<td>Affidavit for Affirmative Action</td>
<td>1</td>
</tr>
<tr>
<td>006113</td>
<td>Performance and Payment Bond</td>
<td>2</td>
</tr>
<tr>
<td>006325</td>
<td>Product Substitution Request</td>
<td>2</td>
</tr>
<tr>
<td>006519.16</td>
<td>Final Receipt of Payment and Release Form</td>
<td>1</td>
</tr>
<tr>
<td>006519.18</td>
<td>MBE/WBE/SDVE Progress Report</td>
<td>1</td>
</tr>
<tr>
<td>006519.21</td>
<td>Affidavit of Compliance with Prevailing Wage Law</td>
<td>1</td>
</tr>
<tr>
<td>007000</td>
<td>CONDITIONS OF THE CONTRACT</td>
<td></td>
</tr>
<tr>
<td>007213</td>
<td>General Conditions</td>
<td>20</td>
</tr>
<tr>
<td>007300</td>
<td>Supplementary Conditions</td>
<td>2</td>
</tr>
<tr>
<td>007346</td>
<td>Wage Rate</td>
<td>4</td>
</tr>
<tr>
<td><strong>DIVISION 01 - GENERAL REQUIREMENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>010000</td>
<td>Summary of Work</td>
<td>5</td>
</tr>
<tr>
<td>010270</td>
<td>Applications for Payment</td>
<td>4</td>
</tr>
<tr>
<td>010350</td>
<td>Modification Procedures</td>
<td>2</td>
</tr>
<tr>
<td>010400</td>
<td>Project Coordination</td>
<td>4</td>
</tr>
<tr>
<td>010450</td>
<td>Request for Information</td>
<td>1</td>
</tr>
<tr>
<td>012100</td>
<td>Allowances</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>City Utilities Extension Contract for Allowance</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>City Utilities Cost Memorandum for Allowance</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>City Utilities Load Sheet</td>
<td>1</td>
</tr>
<tr>
<td>012300</td>
<td>Alternates</td>
<td>2</td>
</tr>
<tr>
<td>012600</td>
<td>Contract Modification Procedures</td>
<td>2</td>
</tr>
<tr>
<td>013100</td>
<td>Coordination</td>
<td>2</td>
</tr>
<tr>
<td>013101</td>
<td>Contractor Safety and Special Instructions</td>
<td>5</td>
</tr>
<tr>
<td>013200</td>
<td>Construction Progress Documentation</td>
<td>4</td>
</tr>
<tr>
<td>013300</td>
<td>Submittal Procedures</td>
<td>10</td>
</tr>
<tr>
<td>014000</td>
<td>Quality Control</td>
<td>3</td>
</tr>
<tr>
<td>015000</td>
<td>Temporary Facilities and Services</td>
<td>3</td>
</tr>
<tr>
<td>016310</td>
<td>Product Substitutions</td>
<td>3</td>
</tr>
<tr>
<td>017000</td>
<td>Construction Procedures</td>
<td>12</td>
</tr>
</tbody>
</table>

SECTION 000110 – TABLE OF CONTENTS
07/16
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>017400</td>
<td>Warranties and Bonds</td>
<td>3</td>
</tr>
<tr>
<td>017419</td>
<td>Construction Waste Management and Disposal</td>
<td>8</td>
</tr>
<tr>
<td>017700</td>
<td>Project Close Out</td>
<td>3</td>
</tr>
<tr>
<td>017821</td>
<td>Project Record Documents</td>
<td>3</td>
</tr>
<tr>
<td>017823</td>
<td>Operation and Maintenance Data</td>
<td>3</td>
</tr>
<tr>
<td>018113.14</td>
<td>Sustainable Design Requirements LEEDv4 Bd+C</td>
<td>8</td>
</tr>
<tr>
<td>019100</td>
<td>General Commissioning</td>
<td>14</td>
</tr>
</tbody>
</table>

**DIVISION 02 -EXISTING CONDITIONS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>024119</td>
<td>Selective Demolition</td>
<td>9</td>
</tr>
</tbody>
</table>

**DIVISION 03 – CONCRETE**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>031000</td>
<td>Concrete Forming And Accessories</td>
<td>7</td>
</tr>
<tr>
<td>032000</td>
<td>Concrete Reinforcing</td>
<td>4</td>
</tr>
<tr>
<td>033000</td>
<td>Cast-In-Place Concrete</td>
<td>23</td>
</tr>
</tbody>
</table>

**DIVISION 04 - MASONRY**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>042000</td>
<td>Unit Masonry</td>
<td>23</td>
</tr>
<tr>
<td>047200</td>
<td>Cast Stone Masonry</td>
<td>9</td>
</tr>
</tbody>
</table>

**DIVISION 05 - METALS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>051200</td>
<td>Structural Steel Framing</td>
<td>9</td>
</tr>
<tr>
<td>052100</td>
<td>Steel Joist Framing</td>
<td>5</td>
</tr>
<tr>
<td>053100</td>
<td>Steel Decking</td>
<td>6</td>
</tr>
<tr>
<td>054000</td>
<td>Cold-Formed Metal Framing</td>
<td>11</td>
</tr>
<tr>
<td>055000</td>
<td>Metal Fabrications</td>
<td>12</td>
</tr>
<tr>
<td>055113</td>
<td>Metal Pan Stairs</td>
<td>8</td>
</tr>
<tr>
<td>057300</td>
<td>Decorative Metal Railings</td>
<td>7</td>
</tr>
</tbody>
</table>

**VOLUME 2**

**DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>061053</td>
<td>Miscellaneous Rough Carpentry</td>
<td>8</td>
</tr>
<tr>
<td>061600</td>
<td>Sheathing</td>
<td>5</td>
</tr>
<tr>
<td>064023</td>
<td>Interior Architectural Woodwork</td>
<td>4</td>
</tr>
<tr>
<td>064116</td>
<td>Plastic-Laminate-Faced Architectural Cabinets</td>
<td>9</td>
</tr>
</tbody>
</table>

**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>071326</td>
<td>Self-Adhering Sheet Waterproofing</td>
<td>8</td>
</tr>
<tr>
<td>072100</td>
<td>Thermal Insulation</td>
<td>5</td>
</tr>
<tr>
<td>072119</td>
<td>Foamed-In-Place Insulation</td>
<td>3</td>
</tr>
<tr>
<td>072726</td>
<td>Fluid-Applied Membrane Air Barriers</td>
<td>9</td>
</tr>
<tr>
<td>074113.19</td>
<td>Batten-Seam Metal Roof Panels</td>
<td>13</td>
</tr>
<tr>
<td>074213.13</td>
<td>Formed Metal Wall Panels</td>
<td>10</td>
</tr>
<tr>
<td>074213.19</td>
<td>Insulated Metal Wall Panels</td>
<td>10</td>
</tr>
<tr>
<td>074217</td>
<td>Insulated-Core Metal Wall Backup Panel System</td>
<td>6</td>
</tr>
<tr>
<td>074293</td>
<td>Soffit Panels</td>
<td>9</td>
</tr>
<tr>
<td>075419</td>
<td>Polivinyl-Chloride (Pvc) Roofing</td>
<td>15</td>
</tr>
<tr>
<td>076200</td>
<td>Sheet Metal Flashing and Trim</td>
<td>13</td>
</tr>
<tr>
<td>077100</td>
<td>Roof Specialties</td>
<td>6</td>
</tr>
<tr>
<td>077129</td>
<td>Manufactured Roof Expansion Joints</td>
<td>6</td>
</tr>
<tr>
<td>077200</td>
<td>Roof Accessories</td>
<td>8</td>
</tr>
<tr>
<td>077210</td>
<td>Rooftop Fall Arrest System</td>
<td>5</td>
</tr>
<tr>
<td>077253</td>
<td>Snow Guards</td>
<td>5</td>
</tr>
<tr>
<td>078413</td>
<td>Penetration Firestopping</td>
<td>6</td>
</tr>
<tr>
<td>078443</td>
<td>Joint Firestopping</td>
<td>6</td>
</tr>
<tr>
<td>079100</td>
<td>Prefomed Joint Seals</td>
<td>4</td>
</tr>
<tr>
<td>079200</td>
<td>Joint Sealants</td>
<td>10</td>
</tr>
<tr>
<td>079513.13</td>
<td>Interior Expansion Joint Cover Assemblies</td>
<td>4</td>
</tr>
<tr>
<td>079513.16</td>
<td>Exterior Expansion Joint Cover Assemblies</td>
<td>6</td>
</tr>
</tbody>
</table>

**DIVISION 08 - OPENINGS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>081113</td>
<td>Hollow Metal Doors and Frames</td>
<td>8</td>
</tr>
</tbody>
</table>

**SECTION 000110 – Table of Contents**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>0716</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>081416</td>
<td>Flush Wood Doors</td>
<td>7</td>
</tr>
<tr>
<td>083113</td>
<td>Access Doors and Frames</td>
<td>4</td>
</tr>
<tr>
<td>083313</td>
<td>Coiling Counter Doors</td>
<td>7</td>
</tr>
<tr>
<td>083323</td>
<td>Overhead Coiling Doors</td>
<td>9</td>
</tr>
<tr>
<td>083459</td>
<td>Vault Doors and Day Gates</td>
<td>5</td>
</tr>
<tr>
<td>084113</td>
<td>Aluminum-Framed Entrances And Storefronts</td>
<td>14</td>
</tr>
<tr>
<td>084413</td>
<td>Glazed Aluminum Curtain Walls</td>
<td>13</td>
</tr>
<tr>
<td>084523</td>
<td>Fiberglass Sandwich Panel Assemblies</td>
<td>8</td>
</tr>
<tr>
<td>087100</td>
<td>Door Hardware</td>
<td>28</td>
</tr>
<tr>
<td>088000</td>
<td>Glazing</td>
<td>12</td>
</tr>
<tr>
<td>089119</td>
<td>Fixed Louvers</td>
<td>7</td>
</tr>
</tbody>
</table>

**DIVISION 09 - FINISHES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>092216</td>
<td>Non-Structural Metal Framing</td>
<td>8</td>
</tr>
<tr>
<td>092900</td>
<td>Gypsum Board Assemblies</td>
<td>11</td>
</tr>
<tr>
<td>095113</td>
<td>Accoustical Panel Ceilings</td>
<td>9</td>
</tr>
<tr>
<td>096513</td>
<td>Resilient Base and Accessories</td>
<td>7</td>
</tr>
<tr>
<td>096519</td>
<td>Resilient Tile Flooring</td>
<td>6</td>
</tr>
<tr>
<td>096723</td>
<td>Resinous Flooring</td>
<td>5</td>
</tr>
<tr>
<td>096813</td>
<td>Tile Carpeting</td>
<td>7</td>
</tr>
<tr>
<td>098436</td>
<td>Sound-Absorbing Ceiling Units</td>
<td>6</td>
</tr>
<tr>
<td>099000</td>
<td>Painting</td>
<td>9</td>
</tr>
</tbody>
</table>

**DIVISION 10 - SPECIALTIES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>101100</td>
<td>Visual Display Units</td>
<td>6</td>
</tr>
<tr>
<td>101423</td>
<td>Panel Signage</td>
<td>6</td>
</tr>
<tr>
<td>102113.19</td>
<td>Plastic Toilet Compartments</td>
<td>6</td>
</tr>
<tr>
<td>102213</td>
<td>Wire Mesh Partitions</td>
<td>8</td>
</tr>
<tr>
<td>102226</td>
<td>Folding Partition Panels</td>
<td>5</td>
</tr>
<tr>
<td>102800</td>
<td>Toilet, Bath, and Laundry Accessories</td>
<td>6</td>
</tr>
<tr>
<td>104413</td>
<td>Fire Protection Cabinets</td>
<td>4</td>
</tr>
<tr>
<td>105113</td>
<td>Metal Lockers</td>
<td>8</td>
</tr>
</tbody>
</table>

**DIVISION 11 - EQUIPMENT**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>114000</td>
<td>Food Service Equipment (N.I.C.) – Furnished Under Separate Contract</td>
<td>NIC</td>
</tr>
</tbody>
</table>

**DIVISION 12 - FURNISHINGS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>122413</td>
<td>Roller Window Shades</td>
<td>7</td>
</tr>
<tr>
<td>123661.16</td>
<td>Solid Surfacing Countertops</td>
<td>5</td>
</tr>
<tr>
<td>123661.19</td>
<td>Quartz Agglomerate Countertops</td>
<td>5</td>
</tr>
</tbody>
</table>

**DIVISION 14 - CONVEYING EQUIPMENT**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>142123.16</td>
<td>Machine Room-Less Electric Traction Passenger Elevators</td>
<td>10</td>
</tr>
</tbody>
</table>

**VOLUME 3**

**DIVISION 21-28**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>211300</td>
<td>Fire Supression System</td>
<td>21</td>
</tr>
<tr>
<td>220500</td>
<td>Common Work Results for Plumbing</td>
<td>21</td>
</tr>
<tr>
<td>220501</td>
<td>Plumbing Project Coordination and Installation</td>
<td>2</td>
</tr>
<tr>
<td>220516</td>
<td>Expansion Fittings and Loops for Plumbing</td>
<td>4</td>
</tr>
<tr>
<td>220519</td>
<td>Meters and Gauges for Plumbing Piping</td>
<td>4</td>
</tr>
<tr>
<td>220523</td>
<td>Plumbing Valves</td>
<td>3</td>
</tr>
<tr>
<td>220529</td>
<td>Plumbing Supports, Anchors, and Seals</td>
<td>4</td>
</tr>
<tr>
<td>220548</td>
<td>Plumbing Vibration Isolation</td>
<td>6</td>
</tr>
<tr>
<td>220553</td>
<td>Plumbing Identification</td>
<td>4</td>
</tr>
<tr>
<td>220719</td>
<td>Plumbing Piping Insulation</td>
<td>4</td>
</tr>
<tr>
<td>221116</td>
<td>Domestic Water Piping</td>
<td>10</td>
</tr>
<tr>
<td>221119</td>
<td>Domestic Water Piping Specialties</td>
<td>7</td>
</tr>
<tr>
<td>221124</td>
<td>Domestic Water Pumps</td>
<td>6</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Pages</td>
</tr>
<tr>
<td>--------</td>
<td>------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>221316</td>
<td>Sanitary Waste And Vent Piping</td>
<td>4</td>
</tr>
<tr>
<td>221319</td>
<td>Sanitary Waste Piping Specialties</td>
<td>7</td>
</tr>
<tr>
<td>221323</td>
<td>Sanitary Waste Interceptors</td>
<td>3</td>
</tr>
<tr>
<td>221413</td>
<td>Storm Drainage Piping</td>
<td>5</td>
</tr>
<tr>
<td>221423</td>
<td>Storm Drainage Piping Specialties</td>
<td>5</td>
</tr>
<tr>
<td>221429</td>
<td>Sump Pumps</td>
<td>4</td>
</tr>
<tr>
<td>223100</td>
<td>Water Softeners</td>
<td>8</td>
</tr>
<tr>
<td>223500</td>
<td>Domestic Water Heat Exchangers</td>
<td>6</td>
</tr>
<tr>
<td>224000</td>
<td>Plumbing Fixtures And Accessories</td>
<td>5</td>
</tr>
<tr>
<td>224500</td>
<td>Emergency Plumbing Fixtures</td>
<td>5</td>
</tr>
<tr>
<td>230500</td>
<td>Common Work For Results For HVAC</td>
<td>14</td>
</tr>
<tr>
<td>230501</td>
<td>Mechanical Project Coordination And Installation</td>
<td>2</td>
</tr>
<tr>
<td>230516</td>
<td>Expansion Fittings And Loops For HVAC Piping</td>
<td>4</td>
</tr>
<tr>
<td>230519</td>
<td>Meters and Gauges for HVAC Piping</td>
<td>5</td>
</tr>
<tr>
<td>230523</td>
<td>HVAC Valves</td>
<td>3</td>
</tr>
<tr>
<td>230529</td>
<td>Hangers and Supports for HVAC Equipment</td>
<td>5</td>
</tr>
<tr>
<td>230548</td>
<td>HVAC Vibration Isolation</td>
<td>4</td>
</tr>
<tr>
<td>230553</td>
<td>HVAC Identification</td>
<td>4</td>
</tr>
<tr>
<td>230593</td>
<td>Testing, Adjusting, and Balancing for HVAC</td>
<td>3</td>
</tr>
<tr>
<td>230713</td>
<td>HVAC Duct Insulation</td>
<td>3</td>
</tr>
<tr>
<td>230719</td>
<td>HVAC Piping Insulation</td>
<td>5</td>
</tr>
<tr>
<td>230923</td>
<td>Direct Digital Control System for HVAC</td>
<td>27</td>
</tr>
<tr>
<td>230993</td>
<td>Sequences Of Operation</td>
<td>8</td>
</tr>
<tr>
<td>231123</td>
<td>Natural Gas Piping</td>
<td>8</td>
</tr>
<tr>
<td>232113</td>
<td>Hydronic Piping</td>
<td>7</td>
</tr>
<tr>
<td>232116</td>
<td>Hydronic Specialties</td>
<td>7</td>
</tr>
<tr>
<td>232300</td>
<td>Refrigerant Piping</td>
<td>8</td>
</tr>
<tr>
<td>232315</td>
<td>Refrigeration Specialties</td>
<td>5</td>
</tr>
<tr>
<td>233113</td>
<td>HVAC Ductwork</td>
<td>9</td>
</tr>
<tr>
<td>233300</td>
<td>Air Duct Accessories</td>
<td>17</td>
</tr>
<tr>
<td>233416</td>
<td>Centrifugal Exhaust Fans</td>
<td>5</td>
</tr>
<tr>
<td>233600</td>
<td>Air Terminal Devices</td>
<td>5</td>
</tr>
<tr>
<td>233713</td>
<td>HVAC Diffusers, Registers and Grilles</td>
<td>8</td>
</tr>
<tr>
<td>233723</td>
<td>HVAC Gravity Ventilators</td>
<td>4</td>
</tr>
<tr>
<td>233813</td>
<td>Kitchen Exhaust Systems</td>
<td>10</td>
</tr>
<tr>
<td>237313</td>
<td>Modular Indoor Central Station Air Handling Units</td>
<td>8</td>
</tr>
<tr>
<td>238220</td>
<td>Fan-Coil Units and Unit Ventilators</td>
<td>8</td>
</tr>
<tr>
<td>260500</td>
<td>Common Work Results for Electrical</td>
<td>15</td>
</tr>
<tr>
<td>260501</td>
<td>Temporary Electrical Facilities</td>
<td>3</td>
</tr>
<tr>
<td>260519</td>
<td>Low-Voltage Electrical Conductors and Cables</td>
<td>5</td>
</tr>
<tr>
<td>260526</td>
<td>Grounding and Bonding for Electrical Systems</td>
<td>7</td>
</tr>
<tr>
<td>260529</td>
<td>Hangers and Supports for Electrical Systems</td>
<td>4</td>
</tr>
<tr>
<td>260533</td>
<td>Raceway and Boxes for Electrical Systems</td>
<td>5</td>
</tr>
<tr>
<td>260553</td>
<td>Identification for Electrical Systems</td>
<td>6</td>
</tr>
<tr>
<td>260913</td>
<td>Electrical Power Monitoring and Control</td>
<td>10</td>
</tr>
<tr>
<td>260923</td>
<td>Lighting Control Devices</td>
<td>7</td>
</tr>
<tr>
<td>260926</td>
<td>Network Lighting Controls</td>
<td>15</td>
</tr>
<tr>
<td>260936</td>
<td>Modular Dimming Controls</td>
<td>6</td>
</tr>
<tr>
<td>262200</td>
<td>Low-Voltage Transformers</td>
<td>5</td>
</tr>
<tr>
<td>262213</td>
<td>Low-Voltage Distribution Panelboards</td>
<td>6</td>
</tr>
<tr>
<td>262300</td>
<td>Low Voltage Switchgear</td>
<td>21</td>
</tr>
</tbody>
</table>
262413 Integrated Power Center 7
262416 Panelboards 8
262726 Wiring Devices 7
262813 Fuses 3
262816 Enclosed Switches and Circuit Breakers 5
262923 Variable Frequency Drives 9
263213 Engine Generators 16
263600 Transfer Switches 9
264313 Surge Protection Devices (SPD) 9
265100 Interior Lighting 4
265300 Emergency Lighting Fixtures 6
265600 Exterior Lighting 9

270500 Common Work Results for Communications 2
271100 Communications Equipment Room Fittings 2
271500 Communications Horizontal Cabling 4
272500 Cable Tray 5

283100 Fire Alarm System 34

DIVISION 31 – EARTHWORK
311000 Clearing and Grubbing 2
312000 Excavation and Embankment 6
312319 Dewatering 1
312500 Erosion and Sediment Control 6

DIVISION 32 – EXTERIOR IMPROVEMENTS
321123 Crushed Aggregate Base Course 4
321216 Hot-Mix Asphalt Paving 1
321313 Cement Concrete Paving 1
321723 Pavement Markings (Parking Lot) 1
329200 Topsoiling 2
329210 Turf Sodding 6
329220 Turf Seeding 9
329300 Trees Shrubs and Groundcover 11

DIVISION 33 – UTILITIES
331123 Natural Gas Distribution 1
334000 Pipe for Storm Drains and Culverts 4

DIVISION 34 – TRANSPORTATION
344116 Traffic Control 2

VOLUME 4

APPENDIX
Appendix A 2018 Palmerton and Parrish Geotechnical Engineering Report 85
Appendix B City of Springfield Public Works General Conditions and Technical Specifications 248
Appendix C City Utilities Technical Specifications 75

END OF TABLE OF CONTENTS
SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

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. Rooftop equipment bases and support curbs.
2. Wood blocking, cants, and nailers.
3. Wood furring and grounds.
4. Plywood backing panels.

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 or greater size but less than 5 inches nominal size in least dimension.

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. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. LEED Submittals:
1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

2. Certificates for [Credit MR 6] [Credit MR 7]: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

3. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:
   1. Preservative-treated wood.
   2. Fire-retardant-treated wood.
   4. Post-installed anchors.
   5. Metal framing anchors.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Regional Materials: Dimension lumber[, except treated materials,] shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Dress lumber, S4S, unless otherwise indicated.

C. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA 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 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat all miscellaneous carpentry unless otherwise indicated.
   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 framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
   5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
   1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
   1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat all miscellaneous carpentry unless otherwise indicated. items indicated on Drawings, and the following:
   1. Framing for raised platforms.
   2. Concealed blocking.
   3. Roof framing and blocking.
   4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
   5. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction or No. 2 Construction, Stud, or No. 3 Standard, Stud, or No. 3 grade of any species. any of the following species: the following species:
   1. Hem-fir (north); NLGA.
   2. Mixed southern pine or southern pine; SPIB.
   3. Spruce-pine-fir; NLGA.
   4. Hem-fir; WCLIB or WWPA.
   5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

B. Other Framing: No. 2 Construction or No. 2 Construction, Stud, or No. 3 grade of any of the following the following species:
   1. Hem-fir (north); NLGA.
   2. Southern pine; SPIB.
   3. Douglas fir-larch; WCLIB or WWPA.
   4. Spruce-pine-fir; NLGA.
   5. Douglas fir-south; WWPA.
   6. Hem-fir; WCLIB or WWPA.
   7. Douglas fir-larch (north); NLGA.
   8. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
   1. Blocking.
   2. Nailers.
   3. Rooftop equipment bases and support curbs.
   5. Furring.

B. Concealed Boards: 15 percent maximum moisture content of any of the following the following species and grades:
   1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
   2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
   3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: 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. Plywood 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."

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
   1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.
D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
   2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.8 METAL FRAMING ANCHORS

   1. Use for interior locations unless otherwise indicated.

B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
   1. Use for wood-preservative-treated lumber and where indicated.

C. Stainless-Steel Sheet: ASTM A 666, Type 304.
   1. Use for exterior locations and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.
F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
   1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
   1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
   2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
   3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
   4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

H. Sort and select lumber so that natural characteristics 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.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
   1. Use inorganic boron for items that are continuously protected from liquid water.
   2. Use copper naphthenate for items not continuously protected from liquid water.

J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   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. ICC-ES evaluation report for fastener.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 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. 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.

B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring horizontally and vertically at 24 inches o.c.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

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

END OF SECTION 061053
SECTION 061600 - SHEATHING

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.
   B. Related Requirements:
      1. Section 061053 "Miscellaneous Rough Carpentry" for plywood backing panels.
      2. Section 072500 "Weather Barriers" for water-resistant barrier applied over wall sheathing.

1.3 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. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
      2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
      3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
      4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
   B. LEED Submittals:
      1. Certificates for [Credit MR 6] [Credit MR 7]: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
      2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
      3. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:
   1. Wood-preservative-treated plywood.
   2. Fire-retardant-treated plywood.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 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 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

B. Factory mark panels to indicate compliance with applicable standard.

2.3 WALL SHEATHING

A. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. CertainTeed Corporation; GlasRoc.
      b. Georgia-Pacific Building Products; Dens-Glass Gold.
      c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
      d. Temple-Inland Building Products by Georgia-Pacific; GreenGlass Exterior Sheathing.
      e. United States Gypsum Co.; Securock.

   2. Type and Thickness: Regular, 1/2 inch Type X, 5/8 inch thick.

2.4  FASTENERS

A.  General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1.  For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.

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 Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

E.  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.

2.5  SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A.  Sealant for Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants."

B.  Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1.  Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

C.  Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.6  MISCELLANEOUS MATERIALS

A.  Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 or ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
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. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
   3. ICC-ES evaluation report for fastener.

D. Use common wire 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. Install fasteners without splitting wood.

E. Coordinate wall 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.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. 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 masonry or similar 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.
2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

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.
   2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

E. Seal sheathing joints according to sheathing manufacturer’s written instructions.
   1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
   2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061600
SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Wood-Preservative Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
   2. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Sustainable Design Submittals:
   1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
   2. Product Certificates: For materials manufactured within 100 miles of Project, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each raw material.
   3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For interior architectural woodwork.
   1. Include plans, elevations, sections, and attachment details.
   2. Apply AWI Quality Certification Program label to Shop Drawings.

D. Samples: For each exposed product and for each color and finish specified.

1.4 INFORMATIONAL SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program.
1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work 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.

PART 2 - PRODUCTS

2.1 INTERIOR ARCHITECTURAL WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.

B. Regional Materials: Wood products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

C. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
2. Wood Moisture Content: 5 to 10 8 to 13 4 to 9 percent.

2.3 BASIS OF DESIGN PRODUCT

A. Marlite; Sieva Wall System, or Architect approved equal.

2.4 FIRE-RETARDANT-TREATED WOOD MATERIALS

A. Fire-Retardant-Treated Wood Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.

3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Nailers: Softwood or hardwood lumber Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

1. Fire-Retardant Treatment: Complying with requirements; provide where indicated.

B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.

C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

D. Adhesives: Use adhesives that meet 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."

E. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

1. Adhesives shall have a VOC content of [70] <Insert value> g/L or less.

2. Adhesive 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."

2.6 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. 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 allowance for scribing, trimming, and fitting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition interior architectural woodwork to average prevailing humidity conditions in installation areas.

B. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
C. Install interior architectural woodwork 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.

D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.

1. For shop-finished items, use filler matching finish of items being installed.

F. Touch up finishing work specified in this Section after installation of interior architectural woodwork. Fill nail holes with matching filler where exposed.

END OF SECTION 064023
SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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 architectural cabinets.
      2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets that are not concealed within other construction.
   B. Related Requirements:
      1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
      2. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.3 COORDINATION
   A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
   B. Sustainable Design Submittals:
      1. Product Certificates: For materials manufactured within 100 miles of Project, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each raw material.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For plastic-laminate-faced architectural cabinets.
   1. Include plans, elevations, sections, and attachment details.
   2. Show large-scale details.
   3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
   5. Apply AWI Quality Certification Program label to Shop Drawings.

D. Samples: For each exposed product and for each color and texture specified, in manufacturer's or fabricator's standard size.

E. Samples for Initial Selection: For each type of exposed finish.

F. Samples for Verification: For the following:
   1. Plastic Laminates: 12 by 12 inches, for each type, color, pattern, and surface finish required.
      a. Provide one sample applied to core material with specified edge material applied to one edge.
   2. Thermoset Decorative Panels: 12 by 12 inches, for each color, pattern, and surface finish.
      a. Provide edge banding on one edge.
   3. Corner Pieces:
      a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
      b. Miter joints for standing trim.
   4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer fabricator.

B. Product Certificates: For each type of product.

C. Quality Standard Compliance Certificates: AWI Quality Certification Program.

D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.
1.7 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.


1.8 DELIVERY, STORAGE, AND HANDLING

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

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

   1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are 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 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.

   1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.

   2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
B. Grade: Premium Economy.

C. Regional Materials: Wood products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

D. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.

E. Type of Construction: Face frame.

F. Door and Drawer-Front Style: Flush overlay.

G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
   1. Products: Subject to compliance with requirements, provide one of the following:
      b. Formica Corporation; Insert product designation.
      c. Lamin-Art, Inc.; Insert product designation.
      d. Pionite; a Panolam Industries International, Inc. brand; Insert product designation.
      e. Wilsonart LLC; Insert product designation.

H. Laminate Cladding for Exposed Surfaces:
   1. Horizontal Surfaces: Grade HGL.
   2. Vertical Surfaces: Grade VGS.
   3. Edges: Grade VGS.
   4. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels as indicated.

I. Materials for Semiexposed Surfaces:
   1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS
      High-pressure decorative laminate, NEMA LD 3, Grade CLS Thermoset decorative panels.
      a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish, PVC T-mold matching laminate in color, pattern, and finish, PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
      b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
      c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide a surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
   2. Drawer Sides and Backs: Solid-hardwood lumber Thermoset decorative panels with PVC or polyester edge banding.
   3. Drawer Bottoms: Hardwood plywood Thermoset decorative panels.

J. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
K. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

L. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
   1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

M. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the Finish Legend

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
   1. Wood Moisture Content: 5 to 10 percent.

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

C. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
   1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
   3. Straw-Based Particleboard: ANSI A208.1, Grade M-2, except for density.
   4. Softwood Plywood: DOC PS 1, medium-density overlay.
   5. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
   1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
   2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
   3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. For items indicated to receive a stained or natural finish, use organic resin chemical formulation.
3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
4. Mill lumber before treatment and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of architectural cabinets.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets

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. Accuride International.
   b. Blum, Julius & Co., Inc.
   c. CompX International, Inc.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 135 170 degrees of opening, self-closing.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal plastic, 4 inches long, 5/16 inch in diameter 5 inches long, 2-1/2 inches deep, and 5/16 inch in diameter.

E. Catches: Magnetic catches, BHMA A156.9, B03141 Push-in magnetic catches, BHMA A156.9, B03131 Roller catches, BHMA A156.9, B03071 Ball friction catches, BHMA A156.9, B03013.

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081 BHMA A156.9, B04102; with shelf brackets, B04112.

G. Shelf Rests: BHMA A156.9, B04013; metal plastic metal, two-pin type with shelf hold-down clip.

H. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.

   a. Type: Full extension.
   b. Material: Zinc-plated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full overtravel-extension type; zinc-plated-steel ball-bearing slides.

3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.

4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.

5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.

6. For computer keyboard shelves, provide Grade 1.

7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.

I. Door Locks: BHMA A156.11, E07121.

J. Drawer Locks: BHMA A156.11, E07041.

K. Door and Drawer Silencers: BHMA A156.11, L03011.

L. Grommets for Cable Passage: 1-1/4-inch 2-inch Insert dimension OD, molded-plastic grommets and matching plastic caps with slot for wire passage.


M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

N. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

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

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Use adhesives that meet 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."

D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement Contact cement PVA Urea formaldehyde Resorcinol.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS 064116 - 7
B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

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

D. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."

1. For glass in frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116
SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

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. Modified bituminous sheet waterproofing.
   2. Blindside sheet waterproofing.
B. Related Requirements:
   1. Section 079513.16 "Exterior Expansion Joint Cover Assemblies" for exterior-wall expansion-joint assemblies that interface with waterproofing.

1.3 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.
   1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product.
   1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
   2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
B. Sustainable Design Submittals:
   1. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
C. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

D. Samples: For each exposed product and for each color and texture specified, including the following products:
   1. 8-by-8-inch square of waterproofing and flashing sheet.
   2. 4-by-4-inch square of drainage panel.

1.5 INFORMATIONAL SUBMITTALS
A. Qualification Data: For Installer.
B. Field quality-control reports.
C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE
A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.7 FIELD CONDITIONS
A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
   1. Do not apply waterproofing in snow, rain, fog, or mist.
B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY
A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
B. Installer's Special Warranty: Specified form, on warranty form at end of this Section, signed by Installer, covering Work of this Section, for warranty period of two years.
   1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, molded-sheet drainage panels from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil-thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Carlisle Coatings & Waterproofing Inc; CCW MiraDRI 860/861.
   c. Henry Company; Blueskin WP 200.

2. Physical Properties:
   a. Tensile Strength, Membrane: 325 psi minimum; ASTM D 412, Die C, modified.
   b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
   d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836/C 836M.
   e. Puncture Resistance: 50 lbf minimum; ASTM E 154/E 154M.
   f. Water Absorption: 0.1 percent weight-gain maximum after 72-hour immersion at 70 deg F; ASTM D 570.
   g. Water Vapor Permeance: 0.05 perm maximum; ASTM E 96/E 96M, Water Method.
   h. Hydrostatic-Head Resistance: 200 feet minimum; ASTM D 5385.


2.3 BLINDSIDE SHEET WATERPROOFING

A. Blindside Sheet Waterproofing for Vertical Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:

1. Physical Properties:
   b. Peel Adhesion to Concrete: 5 lbf/in. minimum; ASTM D 903, modified.
   c. Lap Adhesion: 2.5 lbf/in. minimum; ASTM D 1876, modified.
   e. Puncture Resistance: 231 lbf minimum; ASTM E 154/E 154M.
f. Water Vapor Permeance: 0.1 perm maximum; ASTM E 96/E 96M, Water Method.
g. Ultimate Elongation: 335 percent minimum; ASTM D 412, modified.

B. Blindside Sheet Waterproofing for Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:

1. Physical Properties:
   b. Peel Adhesion to Concrete: 5 lbf/in. minimum; ASTM D 903, modified.
   c. Lap Adhesion: 2.5 lbf/in. minimum; ASTM D 1876, modified.
   e. Puncture Resistance: 231 lbf minimum; ASTM E 154/E 154M.
   f. Water Vapor Permeance: 0.1 perm maximum; ASTM E 96/E 96M, Water Method.
   g. Ultimate Elongation: 335 percent minimum; ASTM D 412, modified.

C. Mastic, Adhesives, and Detail Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

2.4 AUXILIARY MATERIALS

A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne solvent-borne primer recommended for substrate by sheet-waterproofing material manufacturer.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers.

G. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

1. Thickness: Nominal 1/8 inch for vertical applications; 1/4 inch elsewhere.
2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.
2.5 MOLDED-SHEET DRAINAGE PANELS

A. Molded-Sheet Drainage Panel: Comply with Section 334600 "Subdrainage."

B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and 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 through the core of 9 to 21 gpm per ft. Insert values.

1. Products: Subject to compliance with requirements, provide one of the following:
   b. BASF Corporation-Construction Systems; MasterSeal 975 (Pre-2014: Sonoshield DBS 6200).
   c. Carlisle Coatings & Waterproofing Inc; CCW MiraDRAIN 6200CCW MiraDRAIN 6200XL.
   d. CETCO, a subsidiary of Minerals Technologies Inc.; Aquadrain 15XP.
   e. Grace Construction Products; W.R. Grace & Co. -- Conn.; Hydroduct 220Hydroduct 660.
   f. Insulation Solutions, Inc.; AquaCheck DB 1500AquaCheck DB 2500.
   g. Polyguard Products, Inc.; Polyflow 10-Polyflow 15-P.

2.6 INSULATION DRAINAGE PANELS

A. Insulation: Comply with Section 072100 "Thermal Insulation" for general building insulation, including insulation drainage panels.

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 waterproofing.

1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.

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

3.2 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
   1. Install sheet strips of width according to manufacturer’s written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

F. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer’s written instructions.
   1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
   1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
      a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

A. Install modified bituminous sheets according to waterproofing manufacturer’s written instructions and per recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
   1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

D. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
E. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

F. Seal edges of sheet-waterproofing terminations with mastic.

G. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.

H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

I. Immediately install protection course with butted joints over waterproofing membrane.

1. Molded-sheet drainage panels Insulation drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.4 BLINDSIDE SHEET-WATERPROOFING APPLICATION

A. Install blindside sheet waterproofing according to manufacturer's written instructions.

B. Horizontal Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation.

C. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

D. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.

E. Install sheet-waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.

F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

3.5 MOLDED-SHEET DRAINAGE-PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck 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.

1. For vertical applications, install protection course before installing drainage panels.
3.6 INSULATION DRAINAGE-PANEL INSTALLATION

A. Install insulation drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.

B. Ensure that drainage channels are aligned and free of obstructions.

C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.

D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

B. Waterproofing will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.8 PROTECTION, REPAIR, AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

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

END OF SECTION 071326
SECTION 072100 - THERMAL INSULATION

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. Glass-fiber blanket.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for insulation installed in masonry cells.
2. Section 061600 "Sheathing" for foam-plastic board sheathing installed directly over wood or steel framing.
3. Section 072119 "Foamed-in-Place Insulation" for spray-applied polyurethane foam insulation.
4. Section 074113.19 "Batten Seam Metal Roof Panels" for insulation specified as part of roofing insulation.
5. Section 075419 "Polyvinyl-Chloride (PVC) Roofing" for insulation specified as part of roofing construction.
6. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Low-emitting product certification.

1.4 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.
1.5 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

A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.

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

   1. Basis-of-Design Product: Subject to compliance with requirements, provide Dow Chemical Company (The); STYROFOAM Brand CAVITYMATE Plus Insulation or comparable product by one of the following:
      a. DiversiFoam Products.
      b. Owens Corning.


2.2 GLASS-FIBER BLANKET

A. Glass-Fiber Blanket, Unfaced : 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. Guardian Building Products, Inc.
      c. Johns Manville; a Berkshire Hathaway company.
      d. Knauf Insulation.
      e. Owens Corning.
2.3 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

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.

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 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 SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer’s recommended adhesive according to manufacturer’s written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units 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 in from exterior walls.
3.4 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer’s written instructions. Space anchors according to insulation manufacturer’s written instructions for insulation type, thickness, and application.
2. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer’s written instructions.

3.5 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.6 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. Glass-Fiber 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.

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
SECTION 072119 - FOAMED-IN-PLACE INSULATION

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. Closed-cell spray polyurethane foam.
B. Related Requirements:
   1. Section 072100 "Thermal Insulation" for foam-plastic board insulation.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.

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. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from [ICC-ES] <Insert applicable model code organization>.

1.5 QUALITY ASSURANCE
A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM
A. Closed-Cell Spray Polyurethane Foam: ASTM C 1029, Type II, minimum density of 2.0 lb/cu. ft. (24 kg/cu. m) and minimum aged R-value at 1-inch (25.4-mm) thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F (43 K x sq. m/W at 24 deg C).
1. Basis-of-Design Product: Subject to compliance with requirements, provide Johns Manville; a Berkshire Hathaway company; JM Corbond III or comparable product by one of the following:
   a. BASF Corporation.
   b. Dow Chemical Company (The).
   c. Henry Company.

2. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.


2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.

B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer’s written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Spray insulation to envelop entire area to be insulated and fill voids.

C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.

E. Cavity Walls: Install into cavities to [thickness indicated on Drawings] [fully fill void].

F. Miscellaneous Voids: Apply according to manufacturer’s written instructions.
3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 072119
SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

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. Vapor-permeable, fluid-applied air barriers.

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.
   1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.
B. Sustainable Design Submittals:
   1. Product Data: For coatings, indicating VOC content.
   2. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
C. Shop Drawings: For air-barrier assemblies.
   1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
   2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   3. Include details of interfaces with other materials that form part of air barrier.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

D. Field quality-control reports.

1.7 QUALITY ASSURANCE

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

   1. Installer shall be licensed by ABAA according to ABAA’s Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

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

   1. Build integrated mockups of exterior wall assembly, 150 sq. ft., incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

      a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
      b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
      c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.

2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

B. VOC Content: 100 g/L or less.

C. Low-Emitting Materials: Products 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.”

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

2.3 HIGH-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. High-Build, Vapor-Permeable Air Barrier: membrane with an installed dry film thickness, according to manufacturer’s written instructions, of 35 mils or thicker over smooth, void-free substrates.

1. Synthetic Polymer Type:

   a. Products: Subject to compliance with requirements, provide one of the following:
2.4 MEDIUM-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Medium-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 17 to 30 mils over smooth, void-free substrates.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. 3M Industrial Adhesives and Tapes Division; 3M Liquid Air Barrier 2085VP.
   b. DuPont Building Innovations: E. I. du Pont de Nemours and Company; DuPont Tyvek Fluid Applied WB.
   c. Rubber Polymer Corporation, Inc.; Rub-R-Wall Airtight VP.
   d. Sto Corp; StoGuard AirSeal.
   e. TK Products; TK-Airmax 2104 Vapor Permeable.
   f. W.R. Meadows, Inc; Air-Shield LMP.

2. Physical and Performance Properties:
   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Vapor Permeance: Minimum 10 perms; ASTM E 96/E 96M, Desiccant Method, Procedure A.
   c. Ultimate Elongation: Minimum 250 percent; ASTM D 412, Die C.
   d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541.
   e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
   f. UV Resistance: Can be exposed to sunlight for 180 days according to manufacturer's written instructions.

2.5 LOW-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Low-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 6 to 15 mils over smooth, void-free substrates.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. BASF Corporation; Wall Systems.
   b. Polyguard Products, Inc.;
   c. PROSOCO, Inc.
2.6 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

C. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dow Corning Corporation; 123 Silicone Seal.
   b. GE Construction Sealants; Momentive Performance Materials Inc.; US11000 UltraSpan.
   c. Pecora Corporation; Sil-Span.
   d. Tremco Incorporated; Spectrem Simple Seal.

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 substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.

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

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

H. Bridge isolation joints expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer’s written instructions and details.

3.3 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer’s written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air-barrier assembly within manufacturer’s recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply preformed silicone extrusion so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.
2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, transition strip.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.

2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.

1. Vapor-Permeable, High-Build Air Barrier: Total dry film thickness [as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils] <Insert dimension>, applied in [one coat] [two equal coats] [one or more equal coats].

C. Medium-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.

1. Vapor-Permeable, Medium-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one or more equal coats. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

D. Low-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
1. **Vapor-Permeable, Low-Build Air Barrier:** Total dry film thickness [as recommended in writing by manufacturer to comply with performance requirements] <Insert dimension>, applied in [one coat] [two equal coats] [one or more equal coats]. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

E. Do not cover air barrier until it has been tested and inspected by testing agency.

F. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

### 3.5 FIELD QUALITY CONTROL

A. **ABAA Quality Assurance Program:** Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. **Testing Agency:** Engage a qualified testing agency to perform tests and inspections.

C. **Inspections:** Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Air-barrier dry film thickness.
3. Continuous structural support of air-barrier system has been provided.
4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
5. Site conditions for application temperature and dryness of substrates have been maintained.
6. Maximum exposure time of materials to UV deterioration has not been exceeded.
7. Surfaces have been primed, if applicable.
8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
9. Termination mastic has been applied on cut edges.
10. Strips and transition strips have been firmly adhered to substrate.
11. Compatible materials have been used.
12. Transitions at changes in direction and structural support at gaps have been provided.
13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. All penetrations have been sealed.

D. **Tests:** As determined by testing agency from among the following tests:

1. **Air-Leakage-Location Testing:** Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers.
2. **Air-Leakage-Volume Testing:** Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783 or ASTM E 2357.
3. **Adhesion Testing:** Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.
1. Apply additional air-barrier material, according to manufacturer’s written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer’s written instructions.

G. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer’s written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer’s written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726
SECTION 074113.19 - BATTEN-SEAM METAL ROOF PANELS

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. Batten-seam metal roof panels.
2. Self-adhering, high-temperature underlayment.
3. Cover board.
4. Roof insulation.

B. Related Sections:

1. Section 074293 "Soffit Panels" for metal panels used in horizontal soffit applications.
2. Section 077210 "Rooftop Fall Arrest System" for rooftop fall arrest component attached to batten-seam metal roofing.
3. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review structural loading limitations of [deck] [purlins and rafters] during and after roofing.
6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal panel systems during and after installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

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 for each type of panel and accessory.

B. Sustainable Design Submittals:
   1. Product Test Reports: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
   2. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

C. 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.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

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

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

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

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

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. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical roof area and eave[, including fascia,] [and soffit] as shown on Drawings; approximately 12 feet square by full thickness, including attachments[, underlayment,] and accessories.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 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.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.9 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.

1.10 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
B. 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.

1.11 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: [Two] <Insert number> 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] [10] <Insert number> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Energy Performance: Provide roof panels that are listed on the EPA/DOE’s ENERGY STAR "Roof Product List" for [low] [steep]-slope roof products.

B. 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. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

C. Air Infiltration: Air leakage of not more than 0.03 cfm/sq. ft. when tested according to ASTM E 1680[ or ASTM E 283] at the following test-pressure difference:

D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft.

E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

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

1. Uplift Rating: UL 90.

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

1. Fire/Windstorm Classification: Class 1A-90.
2. Hail Resistance: SH.

H. 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 BATTEN-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panel assembly designed to be installed by covering vertical side edges of adjacent panels with battens and mechanically attaching panels to supports using concealed clips. Include battens and accessories required for weathertight installation.

B. Seamed-Batten Metal Roof Panels Insert drawing designation: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced a smooth, flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging the opposite edge of adjacent panels, and installing mechanically seamed battens over panel joints.

1. Basis-of-Design Product: Subject to compliance with requirements, provide CENTRIA Architectural Systems (SRS3) product indicated on Drawings or comparable product by one of the following:

   a. ADPI (3 T Batten)
   b. Construction Metal Products (Series 3000).
   c. Englert, Inc. (S300)

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
a. Nominal Thickness: 0.022 inch  0.028 inch  0.030 inch  0.040 inch  0.052 inch (22 gage).
c. Color: As indicated by manufacturer's designations Match Architect's samples As selected by Architect from manufacturer's full range Insert color.

3. Batten Material: Same material, finish, and color as roof panels Insert material and finish requirements.

4. Clips: One-piece fixed Two-piece floating to accommodate thermal movement.
   a. Material: 0.025-inch-  0.062-inch- stainless-steel sheet in thickness required by manufacturer to meet design conditions.

5. Panel Coverage: 12 inches  18 inches  24 inches Insert dimension.

6. Panel Height: 3 inches Insert dimension measured from top of flat portion of panel to top of installed mechanically fastend batten seam.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.

2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Carlisle Residential; a division of Carlisle Construction Materials; WIP 300HT.
   c. Henry Company; Blueskin PE200 HT.
   d. Kirsch Building Products, LLC; Sharkskin Ultra SA.
   e. Owens Corning; WeatherLock Specialty Tile and Metal Underlayment.

2.4 COVER BOARD


B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by batten-seam metal roofing panel manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Global-approved roof insulation.
B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces. Basis-of-Design Product, Johns Manville Energy 3.

1. Provide two layers of insulation if thickness is over 2 inches.

2.6 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 or plastic 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.

2.7 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal 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 panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, 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: 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.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels roof fascia and rake trim.

E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot-long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
F. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch. Insert dimension nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.

1. Insulate roof curb with 1-inch-thick, rigid insulation.

G. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

H. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. 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.
2. 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.

2.8 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. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer’s written instructions and to comply with details shown.

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.

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.

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.
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 nonexpansion, 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 roof panel manufacturer for application, but not less than thickness of metal being secured.

2.9 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 unacceptable. 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. Steel Panels and Accessories:
   1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   2. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.
   3. 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.

D. 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.
   2. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   3. Mica Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended mica flakes 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.
   4. Metallic Fluoropolymer: AAMA 2605. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   5. FEVE Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
6. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

7. Exposed Anodized Finish:
   a. Clear Anodic Finish: AAMA 611, or thicker.

E. Stainless-Steel Panels and Accessories:
   1. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
      a. Run grain of directional finishes with long dimension of each piece.
      b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

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 primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
   2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
      a. Verify that air- or water-resistant 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 subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYERMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated [below] [on Drawings], wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
1. Apply over the entire roof surface.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

A. General: Install metal 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 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 panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistant barriers and flashings that will be concealed by metal panels are installed.
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 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 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. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. 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. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

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. Batten-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each batten-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Install clips to supports with self-drilling fasteners.
2. Apply battens to metal roof panel seams, fully engaged to provide weathertight joints.
3. Watertight Installation:
   a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommended by manufacturer as needed to make panels watertight.
   b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
   c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
F. 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. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

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 and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.

2. Connect downspouts to underground drainage system indicated.

J. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

K. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

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

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal roof panel installation, including accessories. Report results in writing.
B. Remove and replace metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor’s expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

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. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.19
SECTION 074213.13 - FORMED METAL WALL PANELS

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. Exposed-fastener, lap-seam metal wall panels.

B. Related Sections:

1. Section 074213.19 "Insulated Metal Wall Panels" for foamed-in-place, laminated and honeycomb insulated metal wall panels.
2. Section 074293 "Soffit Panels" for metal panels used in horizontal soffit applications.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner’s insurer if applicable, metal panel Installer, metal panel manufacturer’s representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer’s written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
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 for each type of panel and accessory.

B. Sustainable Design Submittals:
   1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

C. 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.

D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
   1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

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

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

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

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. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical metal panel assembly, including corner, supports, attachments, and accessories.
2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 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.

1.9 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.

1.10 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.

1.11 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: Two 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: 10 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. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:


C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:


D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. 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 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
B. Corrugated-Profile, Exposed-Fastener Metal Wall Panels MP-1: Formed with alternating curved ribs spaced at 2.67 inches (68 mm) o.c. across width of panel.

1. Basis-of-Design Product: Subject to compliance with requirements, provide CENTRIA Architectural Systems; Econolap ¾ or a comparable product by one of the following:
   a. AEP Span; A BlueScope Steel Company.
   b. Alcoa Architectural Products (USA).
   c. ATAS International, Inc.
   d. Berridge Manufacturing Company.
   e. Englert, Inc.
   f. Fabral.
   g. Firestone Building Products.
   h. Flexospan Steel Buildings, Inc.
   i. Industrial Building Panels, Inc.
   j. Jarden Zinc Products.
   k. McElroy Metal, Inc.
   l. MBCI.
   m. Metal Sales Manufacturing Corporation.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   a. Nominal Thickness: 0.030 inch (22 gage).

3. Rib Spacing: 12 inches 2.67 inches o.c.
4. Panel Coverage: 34.6 inches.
5. Panel Height: 0.75 inch.

C. Horizontal Ribbed-Profile, Exposed-Fastener Metal Wall Panels MP-2: Formed with alternating ribs spaced at 12 inches (304.8 mm) o.c. across width of panel. Single-skin exposed fastener metal wall panels serving as the exterior rainscreen cladding component of a metal wall panel system that includes insulated-core metal wall backup panel system specified in Division 7 Section ÓInsulated-Core Metal Wall Backup Panel System".

1. Basis-of-Design Product: Subject to compliance with requirements, provide CENTRIA Architectural Systems; MR3-36 or a comparable product by one of the following:
   a. AEP Span; A BlueScope Steel Company.
   b. Alcoa Architectural Products (USA).
   c. ATAS International, Inc.
   e. Fabral.
   f. Firestone Building Products.
   g. Flexospan Steel Buildings, Inc.
   h. Industrial Building Panels, Inc.
   i. Jarden Zinc Products.
   j. MBCI.
k. McElroy Metal, Inc.
l. Metal Sales Manufacturing Corporation

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal 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 panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, 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: 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.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. 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.
2. 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.

2.4 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. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer’s written instructions and to comply with details shown.

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.

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.
   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.
   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 nonexpansion, 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. Steel Panels and Accessories:
   1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.
   2. 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.
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 subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 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. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
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 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 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. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use 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 panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.

E. Watertight Installation:

1. 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.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. 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. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. 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).
3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.

D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.5 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 074213.13
SECTION 074213.19 - INSULATED METAL WALL PANELS

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. Foamed-insulation-core metal wall panels with related metal trim and accessories.

B. Related Requirements:

1. Section 074217 "Insulated-Core Metal Wall Backup Panel System" for metal panels used in vertical applications as a backup to masonry veneers and metal composite material wall panels.
2. Section 074293 "Soffit Panels" for metal panels used in horizontal soffit applications.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner’s insurer if applicable, metal panel Installer, metal panel manufacturer’s representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer’s written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
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 for each type of panel and accessory.

B. Sustainable Design Submittals:
   1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

C. 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.

D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below.
   1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 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.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

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

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical metal panel assembly as shown on Drawings, including corner, soffits, supports, attachments, and accessories.
2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 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.

1.9 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.

1.10 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.

1.11 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: Two years from date of Substantial Completion.
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 72:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:


C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:


D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. 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.

E. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics, as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2. Intermediate-Scale Multistory Fire Test: Tested mockup, representative of completed multistory wall assembly of which wall panel is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies.

3. Radiant Heat Exposure: No ignition when tested according to NFPA 268.

4. Potential Heat: Acceptable level when tested according to NFPA 259.

5. Surface-Burning Characteristics: Provide wall panels with a flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E 84.

2.2 FOAMED-INSULATION-CORE METAL WALL PANELS

A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.

1. Insulation Core: Modified isocyanurate or polyurethane foam using a non-CFC blowing agent, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.
   a. Closed-Cell Content: 90 percent when tested according to ASTM D 6226.
   b. Density: 2.0 to 2.6 lb/cu. ft. when tested according to ASTM D 1622.
   c. Compressive Strength: Minimum 20 psi when tested according to ASTM D 1621.
   d. Shear Strength: 26 psi when tested according to ASTM C 273/C 273M.

B. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels <Insert drawing designation>: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Centria Versawall or comparable product by one of the following:
   a. Kingspan Insulated Panels.
   b. MBCI; a division of NCI Group, Inc.
   c. Metl-Span.

2. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   a. Nominal Thickness: 0.030 inch (22 gage).
      1) Color: As noted in Exterior Finish Schedule.
   c. Interior Finish: Siliconized polyester.
      1) Color: As selected by Architect from manufacturer’s full range.


4. Panel Thickness: 2.75 inches.

5. Thermal-Resistance Value (R-Value): 20 according to ASTM C 1363.
2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal 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 panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and rakes, 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: 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.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
   1. 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.
   2. 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.

2.4 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. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. 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.
D. 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.
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 nonexpansion, 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. Steel Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. 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 .

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 subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 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. Shim or otherwise plumb substrates receiving metal panels.

2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.

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 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 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. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

2. 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 panel manufacturer.
D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 INSULATED METAL WALL PANEL INSTALLATION

A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.

1. Fasten foamed-insulation-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
2. Apply panels and associated items true to line for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
3. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
5. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
6. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.
7. Apply snap-on battens to exposed-fastener, insulated-core metal wall panel seams to conceal fasteners.

B. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.

1. Install clips to supports with self-tapping fasteners.

C. 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. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

D. Flashing and Trim: Comply with performance requirements, manufacturer’s written installation instructions, and SMACNA’s "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that 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 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).

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.

C. Manufacturer’s Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.

D. Metal wall panels will be considered defective if they do not pass test and inspections.

E. Additional tests and inspections, at Contractor’s expense, are performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.6 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 074213.19
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. Insulated-core metal wall backup panel system consisting of foamed-insulation-core metal wall panels and accessories.

1.3 PERFORMANCE REQUIREMENTS
A. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
1. Wind Loads: As indicated on the Drawings.
2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/240 of the span.

C. Air Infiltration: Maximum 0.03 cfm/sq. ft. per ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft.

D. Water Penetration: No uncontrolled water penetration at a static pressure of 15 lbf/sq. ft. per ASTM E 331.

E. Thermal Performance: Thermal Resistance (R-value) indicated, per ASTM C 1363, corrected to 15 mph outside and still air inside, as-installed condition including fastening and joints.

F. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.

G. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop-, and field-assembled work.
1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
   a. Flashing and trim.
   b. Anchorage systems.
   c. Extruded trim.

H. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, battens, closures, and other metal wall panel accessories.
2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: 12-inch-long Samples for each type of accessory.

I. Delegated-Design Submittal: For metal wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Exterior elevations, drawn to scale, and coordinating penetrations and wall-mounted items. Show the following:
   1. Wall panels and attachments.
   2. Penetrations of wall by pipes and utilities.

B. Qualification Data: For Installer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

D. Field quality-control reports.

E. Warranties: Sample of special warranties.

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 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 (1:10).

C. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below.
   1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For insulated-core metal wall panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: Manufacturer listed in this Section or approved for Project with minimum 5 years’
experience in manufacture of similar products in successful use in similar applications.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time period allowed for substitution review:
   a. Product data, including certified independent test data indicating compliance with requirements.
   b. Samples of each component.
   c. Sample submitted from similar project.
   d. Sample warranty.

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

C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

D. Buy American Act Certification: Comply with provisions of the Buy American Act 41 U.S.C 10a-10d.

E. Source Limitations: Obtain each type of metal wall panel from single source from a single manufacturer.

F. Preinstallation Conference: Conduct conference at Project site.
   1. Meet with Owner, Architect, Owner’s insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer’s representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels including installers of doors, windows, and louvers.
   2. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
   3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
   4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
   5. Review flashings, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
   6. Review wall panel observation and repair procedures after metal wall panel installation.

G. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical metal panel assembly, including corner, supports, attachments, and accessories.
   2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Centria Metalwrap or comparable product.

2.2 MATERIALS
A. Metallic-Coated Steel Sheet, Coil Coated, per ASTM A 755/A 755M.
   1. Aluminum-Zinc Alloy Coated Steel: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality, with non-embossed, flat surface.
   2. Metal Faces: 0.019 inch/26 gage thick.
   3. Coil Coating:
      a. Outer Face: 0.2-mil Primer Coating
      b. Inner Face: 0.2-mil thick clear coating.
B. Polyisocyanurate Core: Foamed-in-place modified polyisocyanurate, closed-cell, utilizing no CFC or HCFC compounds, with density minimum 2.4 lb/cu. ft. and compressive strength minimum 15 lb/sq. in.
C. Panel Sealant/Vapor Seal: Factory-applied non-curing butyl.

2.3 INSULATED COMPOSITE BACKUP PANELS
A. Factory-foamed, insulated composite backup panels with interlocking side joinery and butt end joints. Fabricate with metal facings bonded to foamed-in-place core. Fabricate interior metal face with planking ribs. Form interlocking joinery to accept concealed fasteners for attachment to supports.

1. Horizontal Metal Wall Backup Panel Size and Thermal Resistance:
   a. 32 inches (813 mm) wide by 3 inches (76 mm) thick; R-21.
B. Panel Configuration: Provide metal wall backup panels configured for the following application system:

1. Horizontal installation metal wall backup panel, with manufacturer-furnished attachment clips, 304 stainless steel fasteners.

2.4 ACCESSORIES
A. Galvanized Masonry Anchors: Manufacturer furnished as designated below shall be incorporated in the panel joinery and panelmidpoint.
   1. Hohmann and Barnard 200 Series Joint Anchors.
   2. Hohmann and Barnard 200 Series Type 1 Surface Mount Anchors.
B. Panel Mounting Zee clips: Manufacturer furnished panel mounting “zee” clips, .0064- inch/14ga thick G90 galvanized steel, configured as a mounting point for various fasteners, clips, or support rails.
D. Sealant:
   2. Exposed: Elastomeric silicone sealant, ASTM C 920, as recommended by panel manufacturer.
E. Fasteners: Corrosion-resistant, self-tapping and self-drilling screws, bolts, nuts, and other fasteners as recommended by panel manufacturer for application.
1. Size fasteners to prevent penetration of interior panelfacing.

2.5 FABRICATION

A. General: Fabricate insulated composite backup panels at the factory, using manufacturer's standard procedures and processes identical to tested units and as necessary to meet performance requirements.

1. Fabricate insulated composite backup panels with joints between panels designed to form weathertight seals.
2. Factory formed insulated composite backup panels in a continuous process with no glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine building structure with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation.

1. Inspect framing that will support insulated composite backup panel system to determine if support components are installed as indicated on approved shop drawings and are within tolerances acceptable to panel manufacturer.

   a. Maximum deviations acceptable to insulated composite backup panel system manufacturer:

      1) 3/8-inch in any 20-foot length vertically or horizontally from the framing face plane.
      2) 3/4-inch maximum deviation from the framing face plane on any building elevation.

B. Correct out of tolerance work and other deficient conditions prior to proceeding with insulated composite backup panel installation.

3.2 INSULATED-CORE METAL BACKUP PANEL SYSTEM INSTALLATION

A. General: Install insulated-core metal backup panel system in accordance with approved shop drawings and manufacturer's recommendations.

B. Installation: Attach backup panels to supports at each panel connection point indicated on approved shop drawings.

1. Install with drain plane of panel facing weather side of installation.
2. Fasten insulated backup panels to building framing with clips provided by manufacturer and recommended fasteners.
3. **Horizontal Joinery:** Working from base to top of the backup panel installation, lap upper panel over lower panel to form a weather tight joint oriented to allow gravity drainage.

4. **Vertical Joinery:**
   
   a. Install vertical butt joints tight with no gap, set against continuous supports.
   
   b. Set panel ends in continuous bead of non-curing butyl sealant as indicated in manufacturer's installation details.
   
   c. Seal butt joints between adjacent panels with a continuous strip of self-adhering flashing at bottom row of panels and where additionally recommended by manufacturer.

### 3.3 ERECTION TOLERANCES

A. Installation Tolerances: Align insulated composite backup panel system within installed tolerance of 1/4-inch in 20 feet, noncumulative, on level and plumb and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

**END OF SECTION 074217**
SECTION 074293 - SOFFIT PANELS

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 soffit panels.
   B. Related Sections:
      1. Section 074113.19 "Batten-Seam Metal Roof Panels" for adjacent roof.

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 construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
   B. Sustainable Design Submittals:
      1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
   C. 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 flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
   D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
      1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.
1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

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

C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

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

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. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical roof eave[, including fascia,] and soffit as shown on Drawings; approximately [four panels wide] <Insert size> by full eave width, including attachments and accessories.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 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.
1.9 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.

1.10 COORDINATION

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

1.11 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: Two 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. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
   1. Test-Pressure Difference: 6.24 lbf/sq. ft..

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. 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 METAL SOFFIT PANELS

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

B. Metal Soffit Panels: Match profile and material of metal wall panels.
   1. Finish: Match finish and color of metal roof panels.
   2. Sealant: Factory applied within interlocking joint.

C. Flush-Profile Metal Soffit Panels SP1: Insert drawing designation: Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
   1. Manufacturers: Subject to compliance with requirements, Basis-of-Design product is Centria; Profile Series IW-10A; 12. Manufacturers offering products that may be incorporated into the Work include:
      b. Peterson Pac Clad Flush Wall Panel 12".
   2. Material: Same material, finish, and color as metal wall panels.
   3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
      a. Nominal Thickness: 0.022 inch.
      c. Color: Refer to Exterior Finish Schedule.
   5. Panel Height: 1.0 inch.
2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer’s standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closure Strips: 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.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polysisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. 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.

2.4 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. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer’s written instructions and to comply with details shown.

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.
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.

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.
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 nonexpansion, 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 soffit 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. Steel Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. 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.

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 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 panel manufacturer.

2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
   a. Verify that air- or water-resistive barriers 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 subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer’s written recommendations.
   1. Soffit Framing: Wire tie[ or clip] furring channels to supports[, as required to comply with requirements for assemblies indicated].

3.3 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. Shim or otherwise plumb substrates receiving metal panels.
   2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
   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 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. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
   1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use 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 panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Watertight Installation:

1. 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.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. 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, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. 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 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 waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 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 074293
SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

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. Adhered polyvinyl chloride (PVC) roofing system.
   2. Substrate board.
   3. Vapor retarder.
   4. Roof insulation.
   5. Walkways.

B. Section includes installation of sound-absorbing insulation strips in ribs of roof deck. Sound-absorbing insulation strips are furnished under Section 053100 "Steel Decking."

C. Related Requirements:
   1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
   2. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
   3. Section 077100 "Roof Specialties" for premanufactured copings and roof edge flashings.
   4. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

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

1.4 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, 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, air barrier 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. Review deck substrate requirements for conditions and finishes, 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 for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

B. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Construction Manager, Owner’s insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier 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 for insurance and certificates if applicable.
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.

1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

B. Sustainable Design Submittals:

1. Product Test Reports: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
2. Product Data: For adhesives and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
4. Environmental Product Declaration: For each product.
5. Health Product Declaration: For each product.

C. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation thickness and slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Tie-in with air barrier.

D. Samples for Verification: For the following products:
   1. Roof membrane and flashing, of color required.
   2. Walkway pads or rolls, of color required.

E. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates:
      a. Submit evidence of compliance with performance requirements.
   2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.

D. Evaluation Reports: For components of roofing system, from ICC-ES.

E. Field Test Reports:
   1. Concrete internal relative humidity test reports.
   2. Fastener-pullout test results and manufacturer’s revised requirements for fastener patterns.

F. Field quality-control reports.

G. Sample Warranties: For manufacturer’s special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.
1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is [UL listed] [listed in FM Approvals' RoofNav] 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.

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 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.

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. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system.

2. Warranty Period: 25 No Dollar Limit years from date of Substantial Completion.

B. Special Project 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 roof membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 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. Roof system and flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Zone 1 (Roof Area Field): As indicated on Structural Drawings.
2. Zone 2 (Roof Area Perimeter): As indicated on Structural Drawings.
3. Zone 3 (Roof Area Corners):

D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.

1. Fire/Windstorm Classification: Class 1A-105.
2. Hail-Resistance Rating: SH.

E. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 or initial SRI not less than 82 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

F. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

G. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

H. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

I. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 POLYVINYL CHLORIDE (PVC) ROOFING

1. **Basis-of-Design Product:** Subject to compliance with requirements, provide Johns Manville; a Berkshire Hathaway company; PVC FB Kee Roof Membrane Adhered System or comparable product by one of the following:
   
   a. Carlisle SynTec Incorporated.
   b. Duro-Last Roofing, Inc.
   c. GAF Materials Corporation.
   d. Versico Incorporated.

2. **Membrane Thickness:** 60 mils.
3. **Exposed Face Color:** White.

### 2.3 AUXILIARY ROOFING MATERIALS

**A. General:** Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. **Adhesives and Sealants:** Comply with VOC limits of authorities having jurisdiction.

2. **Adhesives and sealants shall comply with the following limits for VOC content:**

   a. Plastic Foam Adhesives: 50 g/L.
   b. Gypsum Board and Panel Adhesives: 50 g/L.
   c. Multipurpose Construction Adhesives: 70 g/L.
   d. Fiberglass Adhesives: 80 g/L.
   e. Contact Adhesives: 80 g/L.
   f. PVC Welding Compounds: 510 g/L.
   g. Other Adhesives: 250 g/L.
   h. Single-Ply Roof Membrane Sealants: 450 g/L.
   i. Nonmembrane Roof Sealants: 300 g/L.
   j. Sealant Primers for Nonporous Substrates: 250 g/L.
   k. Sealant Primers for Porous Substrates: 775 g/L.

3. **Adhesives and sealants 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."

**B. Sheet Flashing:** Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.

**C. Prefabricated Pipe Flashings:** As recommended by roof membrane manufacturer.

**D. Roof Vents:** As recommended by roof membrane manufacturer.

**E. Bonding Adhesive:** Manufacturer’s standard, water based.

**F. Water-Based, Fabric-Backed Membrane Adhesive:** Roofing system manufacturer’s standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing. Basis-of-Design Product; Johns Manville PVC Membrane Adhesive (water based), specifically for use with fleece-backed membranes.
G. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

H. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

I. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

J. 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.

2.4 SUBSTRATE BOARDS


B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by PVC roof membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces. Basis-of-Design Product, Johns Manville Enrgy 3 or comparable product by one of the following:

b. Carlisle SynTec Incorporated.
c. Dyplast Products.
d. Firestone Building Products.
e. GAF Materials Corporation.
f. Hunter Panels.
g. Insulfoam LLC; a Carlisle company.
h. Johns Manville; a Berkshire Hathaway company.
i. Rmax, Inc.

2. Compressive Strength: 20 psi.
4. Thickness:

a. Base Layer: 2 inches.
b. Upper Layer: 2 inches (Insert thickness).
C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 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 as follows:

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

   1. Size: Approximately 36 by 60 inches.
   3. Basis-of-Design Product: Johns Manville PVC Heavy-Duty Walkpad (safety yellow), 150 mils (3.81 mm) thick at ladders and elsewhere as indicated.
   4. Basis-of-Design Product: Johns Manville PVC Walkpad (grey), 72 mils (1.83 mm) thick typical.

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."

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 system 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. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
   1. Submit test result within 24 hours of performing tests.
      a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

D. Install sound-absorbing 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, FM Approvals' RoofNav assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

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.

C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

D. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 072726 "Fluid-Applied Membrane Air Barriers."

3.4 SUBSTRATE BOARD INSTALLATION

A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
   1. At steel roof decks, install substrate board at right angle to flutes of deck.
      a. Locate end joints over crests of steel roof deck.
   2. Tightly butt substrate boards together.
   3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
   4. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
3.5 VAPOR RETARDER INSTALLATION

A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
2. Seal laps by rolling.

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

3.6 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:

1. Install base layer of insulation with [joints staggered not less than 24 inches in adjacent rows] [end joints staggered not less than 12 inches in adjacent rows] [and with long joints continuous at right angle to flutes of decking].

   a. Locate end joints over crests of decking.
   b. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
   c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
   d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
   e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

      1) Trim insulation so that water flow is unrestricted.
   
      f. Fill gaps exceeding 1/4 inch with insulation.
   
      g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
   
      h. Loosely lay base layer of insulation units over substrate.
   
      i. Mechanically attach base layer of insulation[ and substrate board] using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

      1) Fasten insulation according to requirements in FM Approvals' RoofNav for specified Windstorm Resistance Classification.
      2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
2. Install upper layers of insulation [and tapered insulation] with joints of each layer offset not less than 12 inches from previous layer of insulation.
   a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
   b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
   c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
   d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
   e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
   f. Trim insulation so that water flow is unrestricted.
   g. Fill gaps exceeding 1/4 inch with insulation.
   h. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
   i. Loosely lay each layer of insulation units over substrate.
   j. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
      1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.7 INSTALLATION OF COVER BOARDS

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.

   1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
   2. At internal roof drains, conform to slope of drain sump.
      a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:

   a. Set cover board in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
   b. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
   c. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

B. Install slip sheet over cover board and immediately beneath roof membrane.
3.8 ADHERED ROOFING INSTALLATION

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel[Owner's testing and inspection agency].

D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.

G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

H. Apply roof membrane with side laps shingled with slope of roof deck where possible.

I. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings 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 roof membrane and sheet flashings.
   2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
   3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

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 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.

1. Install flexible walkways at the following locations:
   a. Perimeter of each rooftop unit.
   b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
   c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
   d. Top and bottom of each roof access ladder.
   e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
   f. Locations indicated on Drawings.
   g. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.

3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.

B. Owner will engage a qualified testing agency to perform the following tests:

1. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
   a. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
   b. Flood each area for 24 hours.
   c. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

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

3.13 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 Roofing Installer will, at Roofing Installer's 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: _____________________________
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. Manufactured through-wall flashing.
      2. Formed roof-drainage sheet metal fabrications.
      5. Formed wall sheet metal fabrications.
   B. Related Requirements:
      1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
      2. Section 075419 "Polyvinyl-Chloride (PVC) Roofing" for materials and installation of sheet metal flashing and trim integral with roofing.
      3. Section 074113.19 "Batten Seam Metal Roof Panels" for materials and installation of sheet metal flashing and trim integral with roofing.
      4. Section 074213.13 and 074213.19 for sheet metal flashing and trim integral with metal wall panels.
      5. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

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.
      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 for each manufactured product and accessory.

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 termination points and assemblies.
   7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
   8. Include details of roof-penetration flashing.
   9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
   10. Include details of special conditions.
   11. Include details of connections to adjoining work.
   12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches (1:10).

D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

E. Samples for Verification: For each type of exposed finish.
   1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
   2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
   3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
   4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.
1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.
B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested and FM Approvals approved.
C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
D. 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.
B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
   1. Build mockup of typical roof edge, including built-in gutter fascia trim, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 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. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Exposed Coil-Coated Finish:
   a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.

2. Color: As selected by Architect from manufacturer’s full range.

3. Concealed Finish: Pretreat with manufacturer’s standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
C. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to
ASTM A 653/A 653M, G90 coating designation aluminum-zinc alloy-coated steel sheet according to
ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating
process to comply with ASTM A 755/A 755M.

1. Surface: Smooth, flat.
2. Exposed Coil-Coated Finish:
   a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70
      percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and
      apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Color: As selected by Architect from manufacturer's full range.
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or
   polyester backer finish, consisting of prime coat and wash coat with minimum total dry film
   thickness of 0.5 mil.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant
   polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt
   adhesive, with release-paper backing; specifically designed to withstand high metal temperatures
   beneath metal roofing. Provide primer according to written recommendations of underlayment
   manufacturer.

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. Carlisle Coatings & Waterproofing Inc; CCW WIP 300HT.
   b. Grace Construction Products; W.R. Grace & Co. -- Conn.; Grace Ice and Water Shield HT.
   c. Henry Company; Blueskin PE200 HT.
   d. Kirsch Building Products, LLC; Sharkskin Ultra SA.
   e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
   f. Polyguard Products, Inc.; Deck Guard HT.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.

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. 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.
   b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
   c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.
5. Fasteners for 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 Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
   2. For Zinc-Tin Alloy-Coated: ASTM B 32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.
   3. 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 with maximum lead content of 0.2 percent.
   4. For Zinc: ASTM B 32, [40 percent tin and 60 percent lead with low antimony,] [with maximum lead content of 0.2 percent,] as recommended by zinc 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 polysulfide silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.


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. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. 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.

E. 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.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

I. 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.

J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

K. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE Roof SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long sections. Furnish with 6-inch- wide, joint cover plates. Shop fabricate interior and exterior corners.
   1. Joint Style: Butted with expansion space and 6-inch- wide, concealed backup plate Butted with expansion space and 6-inch- wide, exposed cover plate.
2. Fabricate from the Following Materials:
   a. Aluminum: 0.050 inch thick.
   b. Galvanized Steel: 0.028 inch thick.
   c. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

B. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-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, fasten and seal watertight. Shop fabricate interior and exterior corners.
   1. Coping Profile: Fig 3-4A according to SMACNA's "Architectural Sheet Metal Manual."
   2. Joint Style: Butted with expansion space and 6-inch-wide, concealed backup plate Butted with expansion space and 6-inch-wide, exposed cover plate.
   3. Fabricate from the Following Materials:
      a. Aluminum: 0.050 inch thick.
      b. Zinc-Tin Alloy-Coated Stainless Steel: 0.024 inch thick.
      c. Galvanized Steel: 0.040 inch thick.
      d. Aluminum-Zinc Alloy-Coated Steel: 0.040 inch thick.

C. Roof Roof-to-Wall Transition Roof-to-Roof Edge-Flashing (Gravel-Stop) Transition Roof-to-Roof Edge-Flashing (Gravel-Stop) and Fascia-Cap Transition Expansion-Joint Cover: Fabricate from the following materials: Shop fabricate interior and exterior corners.
   1. Aluminum: 0.050 inch thick.
   2. Stainless Steel: 0.025 inch thick.
   3. Zinc-Tin Alloy-Coated Stainless Steel: 0.024 inch thick.
   4. Galvanized Steel: 0.034 inch thick.
   5. Aluminum-Zinc Alloy-Coated Steel: 0.034 inch thick.

D. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
   1. Aluminum: 0.040 inch thick.
   2. Stainless Steel: 0.019 inch thick.
   3. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch thick.
   4. Galvanized Steel: 0.028 inch thick.
   5. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
   6. Zinc: 0.032 inch thick.

E. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.019 inch thick.
   3. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch thick.
   4. Galvanized Steel: 0.022 inch thick.
   5. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
   6. Zinc: 0.032 inch thick.
2.7 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:
   1. Stainless Steel: 0.016 inch thick.
   2. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch thick.
   3. Zinc: 0.032 inch thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.016 inch thick.
   3. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch thick.
   4. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft.
   5. Galvanized Steel: 0.022 inch thick.
   6. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
   7. Zinc: 0.032 inch thick.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:
   1. Aluminum: 0.040 inch thick.
   2. Stainless Steel: 0.019 inch thick.
   3. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch thick.
   4. Galvanized Steel: 0.028 inch thick.
   5. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
   1. Stainless Steel: 0.019 inch thick.
   2. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch thick.
   3. Galvanized Steel: 0.028 inch thick.
   4. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

B. Overhead-Piping Safety Pans: Fabricate from the following materials:
   1. Stainless Steel: thick.
   2. Zinc-Tin Alloy-Coated Stainless Steel: 0.024 inch thick.
   3. Galvanized Steel: 0.040 inch thick.
   4. Aluminum-Zinc Alloy-Coated Steel: 0.040 inch thick.
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. 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 3-1/2 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. Torch cutting of sheet metal flashing and trim is not permitted.
6. 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 uncoated-aluminum and 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."

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 and aluminum sheet.
   2. Do not pre-tin zinc-tin alloy-coated stainless steel.
   3. Do not use torches for soldering.
   4. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
   5. 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 cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. **Built-in Gutters**: Join sections with [riveted and soldered joints] [or] [joints sealed with sealant]. Provide for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.
1. Install underlayment layer in built-in gutter trough and extend to drip edge at eaves and under
underlayment on roof sheathing. Lap sides minimum of 2 inches over underlying course. Lap
ends minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches.
Fasten with roofing nails. Install slip sheet over underlayment.
2. Anchor and loosely lock back edge of gutter to continuous [cleat] [eave or apron flashing].
3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 18 inches
apart.
4. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install
expansion-joint caps.

C. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap
joints minimum of 4 inches in direction of water flow.

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 according to recommendations in FM
Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm
classification.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge
flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel
draw band and tighten.

D. 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. Secure in waterproof manner by
means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of
roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that
penetrate roof.

3.6 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. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit
Masonry."

C. 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.

B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

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.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

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
SECTION 077100 - ROOF SPECIALTIES

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. Copings.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
3. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
4. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

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. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
C. Shop Drawings: For roof specialties.
   1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
   2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
   3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
   4. Detail termination points and assemblies, including fixed points.
   5. Include details of special conditions.

D. Samples for Verification:
   1. Include copings roof-edge drainage systems made from 12-inch lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For manufacturer.
B. Product Test Reports: For [copings] [and] [roof-edge flashings], for tests performed by a qualified testing agency.
C. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS
A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE
A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.
   1. Build mockup of typical coping, approximately 10 feet long, including supporting construction, seams, attachments, underlayment, and accessories.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING
A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.
1.8 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer 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 Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FM Approvals’ Listing: Manufacture and install [copings] [roof-edge specialties] that are listed in FM Approvals’ "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals’ markings.

C. SPRI Wind Design Standard: Manufacture and install [copings] [roof-edge specialties] tested according to SPRI ES-1 and capable of resisting the following design pressures:

   1. Design Pressure: As indicated on Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent 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 thermal movements. 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 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Hickman Company, W.P. or comparable product by one of the following:
   a. ATAS International, Inc.
   b. Merchant & Evans Inc.
   c. Petersen Aluminum Corporation.

2. Metallic-Coated Steel Sheet Coping Caps: Zinc-coated (galvanized) steel, nominal thickness as required to meet performance requirements.
   a. Surface: Smooth, flat finish.
   b. Finish: Three-coat fluoropolymer.
   c. Color: As selected by Architect from manufacturer's full range.

3. Formed Aluminum Sheet Coping Caps: Aluminum sheet, thickness as required to meet performance requirements.
   a. Surface: Smooth, flat finish.
   b. Finish: Three-coat fluoropolymer.
   c. Color: As selected by Architect from manufacturer's full range.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

B. Elastomeric Sealant: ASTM C 920, elastomeric [polyurethane] [silicone] polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.4 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: 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer’s written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.

2. Provide uniform, neat seams with minimum exposure of solder and sealant.

3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.

4. Torch cutting of roof specialties is not permitted.

5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.

2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
   1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
   2. 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.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.
   1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer’s required spacing that meets performance requirements.
   2. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer’s required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer’s required spacing that meets performance requirements.

3.4 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 and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100
SECTION 077129 - MANUFACTURED ROOF EXPANSION JOINTS

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. Flanged bellows-type roof expansion joints.
   2. Extruded bellows roof expansion joints.

B. Related Requirements:
   1. Section 061000 "Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.
   2. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-fabricated sheet metal expansion-joint systems, flashing, and other sheet metal items.
   3. Section 077200 "Roof Accessories" for manufactured and prefabricated metal roof curbs.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:
   1. Product Data: For adhesives, indicating VOC content.
   2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For roof expansion joints.
   1. Include plans, elevations, sections, and attachment details.
   2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
   3. Provide isometric drawings of intersections, terminations, changes in joint direction or planes, and transition to other expansion joint systems depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.
D. **Samples:** For each exposed product and for each color specified, 6 inches in size.

1.5 **INFORMATIONAL SUBMITTALS**

A. **Qualification Data:** For Installer.

B. **Product Test Reports:** For each fire-barrier provided as part of a roof-expansion-joint assembly, for tests performed by a qualified testing agency.

C. **Sample Warranties:** For special warranties.

1.6 **QUALITY ASSURANCE**

A. **Installer Qualifications:** Installer of roofing membrane.

1.7 **WARRANTY**

A. **Special Warranty:** Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.

   1. **Warranty Period:** Two years from date of Substantial Completion.

B. **Special Warranty on Painted Finishes:** Manufacturer’s standard form in which manufacturer agrees to repair finish or replace roof expansion joints that show evidence of deterioration of factory-applied finishes within specified warranty period.

   1. **Fluoropolymer Finish:** Deterioration includes, but is not limited to, the following:
      
      a. Color fading more than five 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. **Warranty Period:** 20 years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 **PERFORMANCE REQUIREMENTS**

A. **Thermal Movements:** Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.

   1. **Temperature Change:** 120 deg F, ambient; 180 deg F, material surfaces.
2.2 FLANGED BELLOWS-TYPE ROOF EXPANSION JOINTS

A. Flanged Bellows-Type Roof Expansion Joint: Factory-fabricated, continuous, waterproof, joint cover consisting of exposed membrane bellows laminated to flexible, closed-cell support foam, and secured along each edge to 3- to 4-inch wide metal flange.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC. or comparable product by one of the following:
   a. Balco, Inc.
   b. C/S Group.
   c. InPro Corporation (IPC).
   d. Johns Manville; a Berkshire Hathaway company.
   e. MM Systems Corporation.
   f. Nystrom, Inc.
   g. Watson Bowman Acme Corp.

2. Source Limitations: Obtain flanged bellows-type roof expansion joints approved by roofing manufacturer and that are part of roofing membrane warranty.


5. Flanges: Aluminum, 0.032 inch thick.

6. Configuration: Flat to fit cants as indicated on Drawings.

7. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.

8. Cover Membrane: PVC flexible membrane, factory laminated to bellows and covering entire joint assembly and curbs.

9. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.

10. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the primary bellows assembly.
   a. Drain-Tube Assemblies: Equip secondary seal with drain tubes and seals to direct collected moisture to drain to exterior-wall expansion joint cover.
   b. Thermal Insulation: Fill space above secondary seal with [mineral-fiber blanket] [manufacturer's standard, factory-installed mineral-fiber] [Insert requirement] insulation; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84.

B. Materials:

2. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
3. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
4. Aluminum Sheet: ASTM B 209, mill finish, with temper to suit forming operations and performance required.
a. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious or preservative-treated wood materials.

5. EPDM Membrane: ASTM D 4637/D 4637M, type standard with manufacturer for application.
6. Neoprene Membrane: Neoprene sheet recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil; and as standard with roof-expansion-joint manufacturer for application.
7. PVC Membrane: ASTM D 4434/D 4434M, type standard with manufacturer for application.

2.3 EXTRUDED BELLOWS ROOF EXPANSION JOINTS

A. Extruded Bellows Roof Expansion Joint: Manufactured, continuous, waterproof, joint cover assembly; consisting of primary and secondary, single-layered, elastomeric seals; secured along each edge with extruded-aluminum retainers for fastening to substrate.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Balco, Inc.
   b. MM Systems Corporation.

3. Primary Seal: Silicone extrusion; color: As selected by Architect from manufacturer's full range.
5. Drain-Tube Assemblies: Equip secondary seal with drain tubes and seals to direct collected moisture to drain to exterior-wall expansion joint cover.
6. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.

B. Materials:

1. Aluminum: ASTM B 221 for extrusions; mill finish, with temper to suit forming operations and performance required.
   a. Apply manufacturer's standard protective coating on aluminum surfaces in contact with cementitious or preservative-treated wood materials.

3. EPDM Membrane: ASTM D 4637, type standard with manufacturer for application.

2.4 MISCELLANEOUS MATERIALS

A. Adhesives: As recommended by roof-expansion-joint manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less.
2. Adhesive 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."
B. Fasteners: Manufacturer’s recommended fasteners, suitable for application and designed to withstand design loads.
   1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.


D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joint openings, substrates, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.

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

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for handling and installing roof expansion joints.
   1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
   2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
   3. Provide for linear thermal expansion of roof expansion joint materials.
   4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.
   5. Provide uniform, neat seams.
   6. Install roof expansion joints to fit substrates and to result in watertight performance.

B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.

C. Transitions to Other Expansion-Control Joint Assemblies: Coordinate installation of roof expansion joints with other exterior expansion-control joint assemblies specified in Section 079513.16 "Exterior Expansion Joint Cover Assemblies" to result in watertight performance. [Install factory-fabricated units at transitions between roof expansion joints and exterior expansion-control joint systems.]

D. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.
   1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.
E. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

END OF SECTION 077129
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 hatches.

B. Related Sections:

1. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
2. Section 077100 "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.
3. Section 077253 "Snow Guards" for snow guards.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, watertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.
D. Delegated-Design Submittal: For roof curbs indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer 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 Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design roof curbs to comply with wind performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind-Restraint Performance: As indicated on Drawings.

2.2 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, integral metal cant, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: Coordinate with manufacturer.

D. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch thick.
   1. Finish: Two-coat fluoropolymer.
   2. Color: As selected by Architect from manufacturer’s full range.

E. Construction:
   1. Curb Profile: Manufacturer’s standard compatible with roofing system.
   2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
   3. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
   4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
   5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
   7. Liner: Same material as curb, of manufacturer’s standard thickness and finish.
9. **Wind Restraint Straps and Base Flange Attachment:** Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.

10. **Platform Cap:** Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.

11. **Metal Counterflashiing:** Manufacturer's standard, removable, fabricated of same metal and finish as curb.

12. **Security Grille:** Provide where indicated.

### 2.3 ROOF HATCH

**A. Roof Hatches:** Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

**B. Type and Size:** Single-leaf lid, 36 by 36 inches.

**C. Loads:** Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

**D. Hatch Material:** Aluminum-zinc alloy-coated steel sheet.

1. **Thickness:** Manufacturer's standard thickness for hatch size indicated.
2. **Finish:** Two-coat fluoropolymer.
3. **Color:** As selected by Architect from manufacturer's full range.

**E. Construction:**

1. **Insulation:** Polysiocyanurate board.
   a. **R-Value:** 12.0 according to ASTM C 1363.
2. **Nailer:** Factory-installed wood nailer continuous around hatch perimeter.
3. **Hatch Lid:** Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
4. **Curb Liner:** Manufacturer's standard, of same material and finish as metal curb.
5. **On ribbed or fluted metal roofs,** form flange at perimeter bottom to conform to roof profile.
6. **Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.**

**F. Hardware:** Spring operators, hold-open arm, stainless-steel spring latch with turn handles, stainless-steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

1. **Provide two-point latch on lids larger than 84 inches.**
2. **Provide remote-control operation.**

**G. Safety Railing System:** Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.
1. Height: 42 inches above finished roof deck.
2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.
3. Flat Bar: Galvanized steel, 2 inches high by 3/8 inch thick.
5. Chain Passway Barrier: Galvanized proof coil chain with quick link on fixed end.
7. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
8. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
9. Fabricate joints exposed to weather to be watertight.
10. Fasteners: Manufacturer's standard, finished to match railing system.
   a. Color: As selected by Architect from manufacturer's full range.

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.
   1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
   2. Height: 42 inches above finished roof deck.
   5. Finish: Manufacturer's standard baked enamel or powder coat.
      a. Color: As selected by Architect from manufacturer's full range.
   6. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2.5 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, thickness and thermal resistivity as indicated.

C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

E. Underlayment:
   1. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 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.
   2. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
      3. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
      4. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
      5. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
   3. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

G. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.


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. 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 substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer’s written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of [uncoated aluminum] [stainless-steel] roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer’s recommended slip sheet.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
2. Attach safety railing system to roof-hatch curb.
3. Attach ladder-assist post according to manufacturer’s written instructions.

E. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.
1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

F. Preformed Flashing-Sleeve and Flashing Pipe Portal Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer’s written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer’s instructions.

G. Seal joints with butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."

C. Clean exposed surfaces according to manufacturer’s written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200
SECTION 077210 - ROOFTOP FALL ARREST SYSTEM

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 Rooftop Fall Arrest System and related appurtenances.

B. Related Sections include the following:

1. Section 061053 “Miscellaneous Carpentry” for wood nailers, curbs, and blocking as may be required.
2. Section 074113.19 “Batten-Seam Metal Roof Panels” for shop- and field-formed roof curbs and snow guards for batten-seam metal roofing.
4. Section 077100 "Roof Specialties" for manufactured fasciae, copings, gravel stops and counterflashing.
5. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 SYSTEM DESCRIPTION

A. The Rooftop Fall Arrest System shall allow the user to walk uninterrupted the entire length of the system and provide secure anchorage to arrest a fall by the user. All essential components shall be included as part of the above referenced system, though not specifically stated in the following specifications, so as to provide a complete and fully operational system.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 REFERENCES

A. Occupational Safety and Health Administration (OSHA).

1. 29CFR 1926 Safety and Health Standards.

B. American Society for Testing and Materials.

1.6 PERFORMANCE REQUIREMENTS

A. General: Manufacture and install rooftop Fall Arrest System to resist thermally induced movement and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Thermal Movements: Provide Rooftop Fall Arrest System that allows 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. 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.

C. Water Infiltration: Provide manufactured roof specialties that do not allow water infiltration to building interior.

D. The Rooftop Fall Arrest System shall arrest the workers anywhere along the system including the sloped portion of the system. The system shall also allow the users to walk uninterrupted the entire length of the system without the need to disengage at the intermediate connection points.

1.7 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show layouts of Rooftop Fall Arrest System, including plans and elevations. Identify factory-vs. field-assembled work. Include the following:

1. Details for fastening, joining, supporting, and anchoring Rooftop Fall Arrest System components to adjoining work.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, verifying compliance of Rooftop Fall Arrest System with performance requirements.

D. Manuals containing visual information indicating proper procedures in the usage of the system, inspection and maintenance requirements.

E. Delegated-Design Submittal: Provide design of the rooftop fall arrest system including personnel full-body harness, lanyards, deceleration devices, lifelines, connectors, and all components necessary to provide adequate protection in accordance with this specification and OSHA/ANSI standards. The system shall be designed by a licensed Professional Engineer. Submit signed and sealed calculations.

The fall arrest system shall be designed and coordinated with the batten-seam metal roof system as a complete system with a continuous load path to the structural steel roof deck.

Attachments shall be provided and designed to transfer the fall arrest loading from the fall arrest components to the standing seam roof system. The metal roof system and its connections shall be designed to transfer the fall arrest loading to the structural steel roof deck.

1.8 QUALITY ASSURANCE

A. Product Options: Information on Drawings and in Specifications establishes requirements for system’s aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not 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
B. In order to assure uniform quality, ease of maintenance and minimal parts storage, it is the intent of these specifications that all equipment called for under this section shall be supplied by a single source. The Rooftop Fall Protection System supplier shall be responsible for proper and complete installation of this system of this system.

C. The manufacturer shall have installed and had in satisfactory use for a period of not less than five (5) years and a minimum of five (5) installations of the size and type comparable to the unit specified.

1.9 COORDINATION

A. Coordinate installation of Rooftop Fall Arrest System with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Rooftop Fall Arrest System as supplied by MSA Latchways Fall Protection.

1. Rooftop Fall Arrest System: All connectors, cables and bolts shall be manufactured from stainless: ASTM A666, Type 316. All connectors shall meet and exceed OSHA/ANSI standards. Fabricated supports required for additional support shall be carbon steel with a corrosion resistant finish.

2. All materials shall be new, and the completed fall protection system shall be essentially the product of one manufacturer regularly engaged in the production of such equipment.

2.2 SYSTEM DESIGN

A. The Rooftop Fall Arrest System shall be designed to allow users to walk uninterrupted the entire length of the system without having to unhook from the system to pass through intermediate support points. The system shall be designed to support two (2) users in case of a fall and to restrain the users from reaching the edge of the roof in the event of a fall. The system shall be designed for hands-free operation once the user is properly attached to the system. All components shall be designed by the Fall Protection System supplier and shall meet the applicable requirements of OSHA / ANSI.

B. Description

1. Horizontal Lifeline: Marine grade stainless steel wire rope 8mm 1X19 with a minimum breaking strength of 10,000 pounds, or Structural Beam.

2. Swaging: The cable shall be swaged in-line with the anchor point and have a slip indicator.

3. Shock Absorber: Load limiting in-line shock absorber to 3,000 pounds for multispan systems and 4,500 pounds for single span systems. The shock absorber must visually display deployment in the event a load such as a fall has occurred on the system.

4. End Anchors: 316S stainless steel end anchors with minimum breaking strength of 10,000 pounds.

5. Transfastener/Trolley: 316S stainless steel with a minimum tensile load of 3600 pounds. The transfastener shall allow for easy pass-through of support points without disconnecting from the system.

6. Tension Indicator: The system shall include a tension indicator that will allow the user to physically inspect that the correct cable tension is achieved.

7. Other Components: Corner Assemblies, Turnbuckles and other components shall be 316S stainless steel.

8. Deceleration Device: Provide appropriate length lanyards or self-retracting lifelines that meet or exceed...
applicable standards of OSHA/ANSI.
9. Harness: Provide four (4) full body harnesses with single back D-ring that meet or exceed applicable standards of OSHA/ANSI.
10. Systems shall include life lines, connecting devices, and attachment anchors. System shall be installed at a minimum of 8” above the roof surface.

C. Material Control

1. All system components shall contain serial numbers, permanently stamped or engraved, identifying the specific job and system they are used for. These serial numbers shall be recorded in the system manual as described herein and forwarded to the Owner upon completion of the project.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Fasteners: Manufacturer’s recommended fasteners, suitable for application and designed to withstand design loads. At sheet metal roofs use a minimum of four SS anchors to the batten seams and do not penetrate the batten-seam metal roofing.

C. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 FINISHES

A. Comply with NAAMM’s "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.

1. Examine roofs for suitable conditions for manufactured rooftop Fall Arrest System.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install Rooftop Fall Arrest System according to manufacturer’s written instructions. Anchor Rooftop Fall Arrest System securely in place and capable of resisting forces specified in performance requirements. Use fasteners, separators, sealants, and other miscellaneous items as required to complete rooftop Fall Arrest system.

1. Install Rooftop Fall Arrest System with provisions for thermal and structural movement.
2. Torch cutting of Rooftop Fall Arrest System is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as
1. Coat concealed side of stainless-steel Rooftop Fall Arrest System with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing exposed-to-view components of Rooftop Fall Arrest System specialties directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.


C. Install Rooftop Fall Arrest System level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil-canning, buckling, or toolmarks.

D. Install Rooftop Fall Arrest System to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.

E. Fasteners: Use fasteners of type and size recommended by manufacturer.

F. Do not load or stress Rooftop Fall Arrest System until all materials and fasteners are properly installed and ready for service.

3.3 OPERATOR TRAINING

A. Provide a minimum of four (4) hours of user training after system has been installed and proof tested. Training is to be for the users of the system conducted at the installation site. Provide training CD or thumb drive.

3.4 FIELD QUALITY CONTROL

A. After the safety system is installed and properly tensioned, the safety system manufacturer’s approved authorized representative shall inspect and operate the system and shall make all final adjustments for proper operation.

B. After the system has been placed into operation, the manufacturer’s authorized representative shall perform proof testing and issue a certificate attesting to the systems ability to withstand the proof load.

3.5 CERTIFICATION

A. Each installation shall be certified by a qualified professional engineer and certification shall be submitted with shop drawings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Remove temporary protective coverings and strippable films as manufactured roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

C. Replace manufactured roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077210
SECTION 077253 - SNOW GUARDS

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. Snow guards for batten-seam metal roof
   2. Non-penetrating attachment system for batten-seam metal roof.

B. Related Requirements
   1. Section 074113.19 “Batten-Seam Metal Roof Panels” for surface on which snow guards will be installed.
   2. 075419 “Polyvinyl Chloride (PVC) Roofing” for surface on which snow guards will be installed.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include roof plans showing layouts and attachment details of snowguards.
   1. Include details of snow guards.
   2. Finishes.
   3. Installation instructions.

C. Samples:
   1. Clamp samples.
      a. For units with factory-applied finishes, submit specified color.

D. Delegated-Design Submittal: For snow guards, include analysis reports signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Include calculation of number and location of snow guards.

1.4 INFORMATIONAL SUBMITTALS

SNOW GUARDS 077253 - 1
A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that the engineer is licensed in the state in which the Project is located.

B. Product Test Reports: For each type of snow guard, for tests performed by a qualified testing agency, indicating point of failure of attachment to roof system identical as that used on this Project.

1.5 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit adhesive-mounted snow guards to be installed according to adhesive manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design snow guards, including attachment to building, based on the following:

1. Roof snow load.
2. Snow drifting
3. Roof slope.
4. Roof type.
5. Roof dimensions.
6. Roofing substrate type and thickness.
7. Snow guard type.
8. Snow guard fastening method and strength.
10. Coefficient of Friction Between Snow and Roof Surface: 0.
11. Factor of Safety: 3.

B. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Structural Performance: Snow guards shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Snow Loads: As indicated on Drawings.
2. Attachment: Manufacturer's tested system, capable of resisting design loads.

2.2 SNOW GUARDS

A. Batten-Mounted, Snow Guards:

1. Basis-of-Design Product: Subject to compliance with requirements, provide S-5-T Attachment Solutions; Metal Roof Innovations, Ltd.; ColorGard or a comparable product by one of the following:

   a. Alpine SnowGuards, a division of Vermont Slate & Copper Services, Inc.
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

b. Berger Building Products, Inc.
c. IceBlox Inc.
d. LMCurbs.
e. Metal Roof Innovations, Ltd.
f. PMC Industries, Ltd.
g. Rocky Mountain Snow Guards, Inc.
h. TRA SNOW AND SUN, INC.

2. Description: Snow guard rails fabricated from metal extrusions, anchored to brackets and equipped with one rail with integral track to accept color-matching inserts of material and finish used for batten-seam metal roof.


4. Seam clamps: ASTM B 221 (ASTM B 221M) aluminum extrusion or ASTM B 85/B 85M aluminum casting with stainless-steel set screws incorporating round nonpenetrating point; designed for use with applicable roofing system to which clamp is attached.

B. PVC Membrane-Mounted, Snow Guards:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Alpine SnowGuards SnowMax Bar a comparable product by one of the following:

   a. Alpine SnowGuards, a division of Vermont Slate & Copper Services, Inc.
   b. Berger Building Products, Inc.
   c. IceBlox Inc.
   d. LMCurbs.
   e. Metal Roof Innovations, Ltd.
   f. PMC Industries, Ltd.
   g. Rocky Mountain Snow Guards, Inc.
   h. TRA SNOW AND SUN, INC.

2. Description: Snow guard rails fabricated from metal extrusions, anchored to brackets and equipped with one rail with integral track to accept color-matching inserts of material and finish used for PVC membrane roof.


PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

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

3.2 PREPARATION

A. Clean and prepare substrates for bonding snow guards.

B. Prime substrates according to snow guard manufacturer’s written instructions.
3.3 INSTALLATION

A. Install snow guards according to manufacturer’s written instructions.

1. Space rows as indicated on Shop Drawings.
2. Space rows as recommended by manufacturer.

B. Attachment for Batten-Seam Metal Roofing:

1. Do not use fasteners that will penetrate metal roofing or fastening methods that void metal roofing finish warranty.
2. Batten-Mounted Snow Guards:
   a. Install brackets to vertical ribs in straight rows.
   b. Secure with stainless-steel set screws, incorporating round nonpenetrating point, on same side of standing seam.
   c. Torque set screw according to manufacturer’s instructions.
   d. Install cross members to brackets.

C. Attachment for PVC Roofing:

1. Install Base Plate:
   a. Place the base plate on top of the finished membrane roof. Align the base plate per manufacturer’s recommendations.
   b. Fasten base plate to the substructure per manufacturer’s recommendations and using the appropriate fasteners for the type and thickness of the decking. Make certain that the base plate cannot shift.
   c. Consult with fastener company to determine the fastener required for attaching the base plate to the substructure.
2. Flashing of Base Plate:
   a. Use an acceptable piece and size of flashing material to cover the base plate in a method acceptable by the membrane manufacturer. This size will be a minimum of 12” x 12”
   b. Cut two small holes in flashing per manufacturer’s recommendations to fit tightly over threaded studs
   c. Before installing flashing apply a generous amount of acceptable sealant around threaded studs.
   d. Apply flashing over base plate and bond the perimeter of the flashing to the deck sheet per manufacturer’s specifications.
3. Installation of Snow Guard Bracket:
   a. Install snow guard bracket over the threaded studs. The dovetail feature should be downslope from the studs.
   b. Place one bonded washer over each stud and press them all the way down against the bracket.
   c. Thread one nut down each stud and tighten to manufacturer’s specifications.
4. Installation of Bar:
   a. Place Bar’s dovetail into the dovetail slot on the bracket so that the slotted face of the bar is facing down slope. When properly installed, the face of the bar will help to hide the bracket.
b. Place lock washer on flat head bolt. Insert bolt into the top of the bracket and tighten until the lock washer engages the top of the bracket. Once this interface has been achieved, torque the bolt to a minimum of 100 inch-pounds.

c. Provide bars with manufacturer’s coupling/splice device (rectangular shape) that slides into the slot at the end of the bar. Join successive bars by sliding slotted end over the coupling/splice device.

d. Color Insert. The face of the bar shall be designed to accept a 2” wide color insert. Provide in sheet metal to match the color of the PVC roof membrane.

END OF SECTION 077253
SECTION 078413 - PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
   2. Penetrations in horizontal assemblies.
   3. Penetrations in smoke barriers.

B. Related Sections:
   1. Section 078446 "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 ACTION SUBMITTALS

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

B. LEED Submittals:
   1. Product Data for Credit IEQ 4.1: For penetration firestopping sealants and sealant primers, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for Credit IEQ 4: For penetration firestopping sealants and sealant primers, documentation indicating that products 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."

C. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
   1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
   2. Submit specific firestopping systems to be installed keyed to a plan showing the location of use.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.
B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.

2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
   a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
   b. Classification markings on penetration firestopping correspond to designations listed by the following:
      1) UL in its "Fire Resistance Directory."
      2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
      3) FM Global in its "Building Materials Approval Guide."

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

C. Notify Owner’s testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Grace Construction Products.
3. Hilti, Inc.
6. NUCO Inc.
8. RectorSeal Corporation.
9. Specified Technologies Inc.
10. 3M Fire Protection Products.
12. USG Corporation.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM 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: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

   1. Horizontal assemblies include floors floor/ceiling assemblies.
   2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
   3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

   1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

   1. Permanent forming/damming/backing materials, including the following:
2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.
2.4 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer’s written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

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: Clean out openings immediately before installing penetration firestopping to comply with manufacturer’s written instructions and with the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer’s recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer’s written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
   1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

C. Install fill materials for firestopping by proven techniques to produce the following results:
   1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

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

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.
B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
C. Proceed with enclosing penetration firestopping 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 manufacturers and that do not damage materials in which openings occur.
B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413
SECTION 078443 - JOINT FIRESTOPPING

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. Joints in or between fire-resistance-rated constructions.
   2. Joints at exterior curtain-wall/floor intersections.

B. Related Requirements:
   1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.
   2. Section 092216 "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 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. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
   1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

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

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.

2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

   a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Fire Protection Products.
   c. Blazeframe Industries.
   d. Grabber Construction Products.
   e. Hilti, Inc.
   f. NUCO Inc.
   g. Roxul Inc.
   h. Thermafiber, Inc.; an Owens Corning company.
   i. Tremco, Inc.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E 2307.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
   a. 3M Fire Protection Products.
   b. Hilti, Inc.
   c. Industrial Insulation Group, LLC (IIG-LLC).
   d. Nelson Firestop; a brand of Emerson Industrial Automation.
   e. NUCO Inc.
   f. Roxul Inc.
   g. Specified Technologies, Inc.
   h. Thermafiber, Inc.; an Owens Corning company.
   i. Tremco, Inc.

2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Fire Protection Products.
   c. Hilti, Inc.
   d. Nelson Firestop; a brand of Emerson Industrial Automation.
   e. NUCO Inc.
   f. Roxul Inc.
   g. Specified Technologies, Inc.
   h. Thermafiber, Inc.; an Owens Corning company.
   i. Tremco, Inc.

2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

   1. Sealant shall have a VOC content of 250 g/L or less.
   2. Sealant 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."

F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

   A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, 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 fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

      1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
      2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill 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 joint firestopping system 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 fire-resistive joint systems to comply with manufacturer’s written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. 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:

2. Contractor’s name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer’s name.
6. Installer’s name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
C. Proceed with enclosing joint 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 elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 078443
SECTION 079100 - PREFORMED JOINT SEALS

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. Preformed, foam joint seals.
   B. Related Requirements:
      1. Section 079200 "Joint Sealants" for liquid sealants applied over preformed seals in dual seal systems.

1.3 ACTION SUBMITTALS
   A. Product Data: For each preformed joint seal product.
   B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each product exposed to view.
   C. Samples for Verification: For each type and color of preformed joint seal required, provide Samples with joint seals in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint seals.
   D. Preformed Joint Seal Schedule: Include the following information:
      1. Joint seal location and designation.
      2. Joint width and movement capability.
      3. Joint seal manufacturer and product name.
      4. Joint seal color.

1.4 INFORMATIONAL SUBMITTALS
   A. Product Test Reports: For each preformed joint seal for tests performed by manufacturer and witnessed by a qualified testing agency.
   B. Warranties: For special warranties.
1.5 WARRANTY

A. Special Warranty: Installer agrees to repair or replace preformed joint seals 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 preformed joint seals to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

PART 2 - PRODUCTS

2.1 PREFORMED, FOAM JOINT SEALS

A. Preformed, Foam Joint Seals <Insert drawing designation>: Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
   a. EMSEAL Joint Systems, Ltd.; Emseal 25V.
   b. MM Systems Corporation; [EIF] [EIS] [SIF].
   c. Watson Bowman Acme Corporation; [Wabo SeismicWeatherSeal].

2. Design Criteria:

   a. Nominal Joint Width: As indicated on Drawings.
   b. Maximum Joint Width: As indicated on Drawings.

3. Joint Seal Color: As selected by Architect from full range of industry colors.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by preformed-joint-seal manufacturer for joint substrates indicated.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to preformed joint seal manufacturer, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces, and formulated to promote best adhesion to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with preformed joint seals and surfaces adjacent to joints.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive preformed joint seals, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting preformed-joint seal performance.

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 preformed joint seals to comply with preformed joint seal manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of preformed joint seal, including dust, paints (except for permanent protective coatings tested and approved for seal adhesion and compatibility by seal 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 optimal bond with preformed joint seals. 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. Masonry.

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 seals. Nonporous joint substrates include the following:
   a. Metal.

B. Joint Priming: Prime joint substrates where recommended by preformed joint seal manufacturer or as indicated by tests or prior experience. Apply primer to comply with joint seal manufacturer's written instructions. Confine primers to areas of joint seal bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of adhesive or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

A. General: Comply with preformed joint seal manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
B. Installation of Preformed, Foam Joint Seals:

1. Install each length of seal immediately after removing protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

3.4 PROTECTION

A. Protect preformed joint seals from damage resulting from construction operations or other causes so seals 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 seals immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079100
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. Silicone joint sealants.
   2. Urethane joint sealants.
   3. Immersible joint sealants.
   5. Latex joint sealants.

B. Related Requirements:
   1. Section 079100 "Preformed Joint Seals" for preformed compressible foam and precured joint seals.
   2. Section 079219 "Acoustical Joint Sealants" for sealing joints in sound-rated construction.
   3. Section 321373 "Concrete Paving Joint Sealants" for sealing joints in paved roads, parking lots, walkways, and curbing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. LEED Submittals:
   1. Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Product Test Reports: For each kind of joint sealant, for tests performed by [manufacturer and witnessed by a qualified testing agency] [a qualified testing agency].

C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
   1. Joint-sealant location and designation.
   2. Manufacturer and product name.
   3. Type of substrate material.
   5. Number of samples required.

D. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

E. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

F. Field-Adhesion-Test Reports: For each sealant application tested.

G. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.

   1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
1.7 PRECONSTRUCTION TESTING

A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with stone masonry substrates.
4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
      1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
4. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.8 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.

1.9 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: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

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.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dow Corning Corporation; 758.
   b. GE Construction Sealants; Momentive Performance Materials Inc; SCS2350.
   e. Sherwin-Williams Company (The); White Lightning Silicone Ultra All Purpose Sealant.

2.3 NONSTAINING SILICONE JOINT SEALANTS

   A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

   B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

2.4 URETHANE JOINT SEALANTS

   A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

2.5 MILDEW-RESISTANT JOINT SEALANTS

   A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dow Corning Corporation; 786-M White.
   b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
   c. Tremco Incorporated; Tremsil 200.

2.6 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. BASF Construction Chemicals - Building Systems; Sonolac.
   b. Pecora Corporation; AC-20.
   c. Sherwin-Williams Company (The); 850A 950A PowerHouse.
   d. Tremco Incorporated; Tremflex 834.

2.7 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.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BASF Construction Chemicals - Building Systems.
   b. Construction Foam Products, a division of Nomaco, Inc.
   c. Alcot Plastics Ltd.

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

2.8 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, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: 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. Masonry.
   c. Insert other porous joint substrate.

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. Insert other nonporous joint substrate.

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 joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

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

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of 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 necessary] according to Figure 8B in ASTM C 1193.

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.

   a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:
   a. Whether sealant dimensions and configurations comply with specified requirements.
   b. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer’s field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.

5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

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

   1. Joint Locations:
      a. Control and expansion joints in unit masonry.
      b. Joints between metal panels.
      c. Joints between different materials listed above.
      d. Perimeter joints between materials listed above and frames of louvers.
   2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.

   1. Joint Locations:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Tile control and expansion joints.
      c. Vertical joints on exposed surfaces of unit masonry concrete walls and partitions.
   2. Joint Sealant: Urethane, S, NS, 25, NT.

C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#3.
   1. Joint Locations:
      a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
   3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200
SECTION 079513.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

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 interior expansion joint cover assemblies.

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.

2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches long in size.

D. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:

1. Manufacturer and model number for each expansion joint cover assembly.

2. Expansion joint cover assembly location cross-referenced to Drawings.

3. Nominal, minimum, and maximum joint width.

4. Movement direction.

5. Materials, colors, and finishes.

6. Product options.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical expansion joint cover assembly as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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.

B. Expansion Joint Design Criteria:

1. Type of Movement: Wind sway.
   a. Nominal Joint Width: As indicated on Drawings.

2. Type of Movement: Seismic.
   a. Joint Movement: As indicated on Drawings.

2.3 CEILING EXPANSION JOINT COVERS

A. Acoustical Ceiling Joint Cover: Flush mounted assembly designed for use in acoustical ceilings.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Inpro Corporation; 821 Series, or a comparable product by one of the following:
   a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
   b. Balco, Inc.
   c. BASF Corp. - Watson Bowman Acme Corp.
   d. Construction Specialties, Inc.
   e. Nystrom, Inc.

2. Application: Ceiling to ceiling.
3. Designed for acoustical ceiling system.
C. Basis-of-Design Product: Subject to compliance with requirements, provide Inpro Corporation; 821 Series, or a comparable product by one of the following:
   a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
   b. Balco, Inc.
   c. BASF Corp. - Watson Bowman Acme Corp.
   d. Construction Specialties, Inc.
   e. Nystrom, Inc.

2. Application: Wall to ceiling.
3. Designed for acoustical ceiling system.
   a. Color of Pleated Vinyl Seal: White

2.4 MATERIALS
   A. Elastomeric Seals: Manufacturer’s standard preformed elastomeric membranes or extrusions to be installed in metal frames.

2.5 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. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
   1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
   2. Install frames in continuous contact with adjacent surfaces.
      a. Shimming is not permitted.
   3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
   4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
   5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
   6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

D. 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 or seals and install temporary protection over expansion joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

END OF SECTION 079513.13
SECTION 079513.16 - EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

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 exterior building expansion joint cover assemblies.

B. Related Requirements:

   1. Section 077129 "Manufactured Roof Expansion Joints" for factory-fabricated roof expansion joint cover assemblies.
   2. Section 079100 "Preformed Joint Seals" for preformed foam and extruded-silicone joint seals.

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.
   2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. Samples: For each exposed expansion joint cover assembly and for each color and texture specified, full width by 6 inches long in size.

D. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches long in size.

E. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:

   1. Manufacturer and model number for each expansion joint cover assembly.
   2. Expansion joint cover assembly location cross-referenced to Drawings.
   3. Nominal, minimum, and maximum joint width.
   4. Movement direction.
   5. Materials, colors, and finishes.
6. Product options.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical expansion joint cover assembly as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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.

B. Expansion Joint Design Criteria :

1. Type of Movement: Wind sway.
   a. Nominal Joint Width: As indicated on Drawings.

2. Type of Movement: Seismic.
   a. Joint Movement: As indicated on Drawings.
2.3 EXTERIOR EXPANSION JOINT COVERS

A. Exterior Metal-Plate Joint Cover <Insert drawing designation>: Assembly consisting of sliding metal cover plate in continuous contact with gaskets mounted on metal frames fixed to sides of joint gap.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC or comparable product by one of the following:
   a. Balco, Inc.
   b. Construction Specialties, Inc.
   c. InPro Corporation (IPC).
   d. MM Systems Corporation.
   e. Nystrom, Inc.
   f. Watson Bowman Acme Corp.

2. Application: Wall to wall, Wall to soffit and Soffit to soffit.
3. Installation: Surface mounted.
4. Exposed Metal:
   a. Aluminum: Manufacturer’s standard.
      1) Color: As selected by Architect from full range of industry colors and color densities.
   b. Stainless steel: Manufacturer’s standard.

B. Exterior Elastomeric-Seal Joint Cover <Insert drawing designation>: Assembly consisting of elastomeric seal anchored to surface-mounted frames fixed to sides of joint gap.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC. or comparable product by one of the following:
   a. Balco, Inc.
   b. Construction Specialties, Inc.
   c. InPro Corporation (IPC).
   d. MM Systems Corporation.
   e. Nystrom, Inc.
   f. Watson Bowman Acme Corp.

2. Application: Wall to wall, Wall to soffit, Soffit to soffit.
3. Installation: Surface-mounted [Recessed].
4. Fire-Resistance Rating: Not less than that of adjacent construction.
5. Exposed Metal:
   a. Aluminum: Clear anodic, Class II.
   b. Stainless steel: No. 4.
   c. Bronze: Manufacturer’s standard.
   d. Brass: Manufacturer’s standard.

6. Seal: Preformed elastomeric membrane or extrusion.
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Project Number T1809-01


2.4 MATERIALS

A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, 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. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304 for plates, sheet, and strips.


D. Bronze: ASTM B 455, Alloy C38500 for extrusions; Alloy C23000 red brass for plates.

E. Elastomeric Seals: Manufacturer’s standard preformed elastomeric membranes or extrusions to be installed in metal frames.

F. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

G. Moisture Barrier: Manufacturer’s standard, flexible elastomeric material.

2.5 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.6 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. Run grain of directional finishes with long dimension of each piece.
   2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
   3. Directional Satin Finish: No. 4.

C. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

2.7 ACCESSORIES

A. Moisture Barriers: Manufacturer’s standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
   1. Provide where indicated on Drawings.
B. Manufacturer’s [standard] [stainless-steel] 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. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.

1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.

2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.

3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.

4. Install frames in continuous contact with adjacent surfaces.

   a. Shimming is not permitted.

5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
D. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

E. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.

3.4 CONNECTIONS

A. Transition to Roof Expansion Joint Covers: Coordinate installation of exterior wall and soffit expansion joint covers with roof expansion joint covers specified in Section 077129 "Manufactured Roof Expansion Joints." Install factory-fabricated units at transition between exterior walls and soffits and roof expansion joint cover assemblies.

3.5 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.

END OF SECTION 079513.16
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 standard steel doors and frames.
   2. Exterior standard steel doors and frames.

B. Related Requirements:
   1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
   2. Division 09 Section "Painting" for field painting hollow metal.
   3. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

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 requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

HOLLOW METAL DOORS AND FRAMES
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

C. 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 electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

D. Product Schedule: For hollow-metal doors and frames, 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.

1.7 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.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.
B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum ¼-inch space between each stacked door to permit air circulation. Do not store in a manner that traps excess humidity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements, provide Mesker Door Inc., NVS Door or an approved equal from one of the following:

1. Curries Company; an Assa Abloy Group company.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide assemblies 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. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

3. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

B. Fire-Rated, Borrowed-Lite Assemblies: 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 according to NFPA 257 or UL 9.

C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.50 deg Btu/F x h x sq. ft. when tested according to ASTM C 518.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3; SDI A250.4, Level A.

1. Doors:
2. Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
   b. Sidelite Frames: Fabricated from same thickness material as adjacent door frame.
   c. Construction: Full profile welded.


2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3; SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule.

1. Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
   d. Edge Construction: Model 2, Seamless.
   e. Edge Bevel: Provide manufacturer’s standard beveled or square edges.
   f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
   g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
   h. Core: Manufacturer’s standard.
   i. Fire-Rated Core: Manufacturer’s standard core for fire-rated doors.

2. Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
   b. Construction: Full profile welded.

2.5 BORROWED LITES

A. Fabricate of metallic-coated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Full profile 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.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 FRAME ANCHORS

A. Jamb Anchors:
   1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
   2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
   3. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
   4. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
   5. Compression Type for Drywall Slip-on Frames: NOT PERMITTED.
   6. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer’s standard pipe spacer. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.7 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
E. 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 hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.8 FABRICATION

A. Door 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.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Sidelite 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 welding.

2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

3. 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.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; 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 BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.

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. Provide loose stops and moldings on inside of hollow-metal doors and frames.

4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

5. Provide stops for installation 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.
2.9 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.

PART 3 - EXECUTION

3.1 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. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. General: Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer’s written instructions.

B. Hollow-Metal Frames: Comply with SDI A250.11.
   1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
      a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
      b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames according to NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.
   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. Installation Tolerances: Adjust hollow-metal frames 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 and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with SDIA250.8.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 CLEANING AND TOUCHUP

A. 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.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

C. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish 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
SECTION 081416 - FLUSH WOOD DOORS

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 frames and factory machining for hardware.

B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 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. LEED Submittals:

1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

2. Certificates for [Credit MR 6] [Credit MR 7]: Chain-of-custody certificates indicating that flush wood doors comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

3. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.

C. 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.

D. Samples for Initial Selection: For factory-finished doors.

E. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
   a. Provide Samples for each species of veneer and solid lumber required.
   b. Provide Samples for each color, texture, and pattern of plastic laminate required.
   c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
3. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.
4. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI’s Quality Certification Program.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.7 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.
1.8 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 temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.9 WARRANTY

A. 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.


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. Graham Wood Doors; an Assa Abloy Group company.
4. Lambton Doors.
5. Marlite.
7. Oshkosh 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 AWI's, AWMAC's, and WI's "Architectural Woodwork Standards WDMA I.S.1-A, "Architectural Wood Flush Doors."

1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
B. WDMA I.S.1-A Performance Grade:
   1. Heavy Duty unless otherwise indicated.
   2. Extra Heavy Duty: public toilets exits.

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. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
   2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
   3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
   4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
   5. 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.

   a. Finish steel edges and astragals with baked enamel same color as doors.
   b. Finish steel edges and astragals to match door hardware (locksets or exit devices).

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-1, 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] [or] [structural-composite-lumber] cores instead of particleboard cores for doors indicated to receive exit devices.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:
   1. Grade: Custom (Grade A faces).
   2. Species: Select white maple.
   3. Cut: Plain sliced (flat sliced).
   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: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet or more.
   8. Exposed Vertical Edges: Same species as faces or a compatible species - edge Type A.
10. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
11. Construction: Seven plies, either bonded or nonbonded construction.

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: Species compatible with door faces.
   2. Profile: Manufacturer’s standard shape.
   3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer’s standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer’s standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; with baked-enamel- or powder-coated 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. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
   1. Fabricate door and transom panels with full-width, solid-lumber meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. 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. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1.   Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B.   Factory finish doors.

C.   Transparent Finish:

1.   Grade: Custom.
2.   Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 11, catalyzed polyurethane.
3.   Staining: As selected by Architect from manufacturer's full range.

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.

2. **Bevel non-fire-rated doors** 1/8 inch in 2 inches at lock and hinge edges.

3. **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
SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes access doors and frames for walls and ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

C. Product Schedule: For access doors and frames.

1.4 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

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 and temperature-rise limit ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Concealed Flanges:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Babcock-Davis.
   b. JL Industries, Inc.; a division of the Activar Construction Products Group.
   d. Larsens Manufacturing Company.
   e. Milcor; Commercial Products Group of Hart & Cooley, Inc.
   f. Nystrom, Inc.

2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Wall and ceiling.
4. Door Size: Insert door size as indicated on drawings or required by design.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
6. Frame Material: Same material and thickness as door.
7. Latch and Lock: Cam latch, screwdriver operated.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Babcock-Davis.
   b. JL Industries, Inc.; a division of the Activar Construction Products Group.
   d. Nystrom, Inc.

2. Description: Door face flush with frame, uninsulated; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
3. Locations: Wall and ceiling.
4. Door Size: Insert door size as indicated on drawings or required by design.
5. Fire-Resistance Rating: Not less than that of adjacent construction.
6. Temperature-Rise Rating: 450 deg F at the end of 30 minutes.
7. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage, factory primed.
8. Frame Material: Same material, thickness, and finish as door.

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Frame Anchors: Same material as door face.
D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.5 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.
   2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.

D. Latch and Lock Hardware:
   1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
   2. Keys: Furnish two keys per lock and key all locks alike.
   3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 087100 "Door Hardware."

2.6 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. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
   1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates 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. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113
SECTION 083313 - COILING COUNTER DOORS

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. Counter doors.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of coiling counter door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
3. Include description of automatic closing device and testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
5. Include diagrams for power, signal, and control wiring.

C. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Curtain slats.
2. Bottom bar.
3. Guides.
5. Hood.
6. Locking device(s).
7. Include similar Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For coiling counter doors 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 for both installation and maintenance of units required for this Project.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.

1. Obtain operators and controls from coiling counter door manufacturer.

2.2 COUNTER DOOR ASSEMBLY

A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ACME Rolling Doors.
   b. Alpine Overhead Doors, Inc.
   c. Alumatec Pacific Products.
   d. Amarr Garage Doors.
   e. C.H.I. Overhead Doors.
   f. City-Gates.
   g. Clopay Building Products.
   h. Cookson Company.
   i. Cornell Iron Works, Inc.
   j. Lawrence Roll-Up Doors, Inc.
k. McKeon Rolling Steel Door Company, Inc.
l. Metro Door.
m. Overhead Door Corporation.
n. QMI Security Solutions.
o. Raynor.
p. Wayne-Dalton Corp.

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1. Include tamperproof cycle counter.

C. Door Curtain Material: Stainless steel.

D. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.

1. Insulated-Slat Interior Facing: Metal.
2. Gasket Seal: Manufacturer’s standard continuous gaskets between slats.

E. Bottom Bar: Manufacturer’s standard continuous channel or tubular shape, fabricated hot-dip galvanized steel stainless steel or aluminum extrusion and finished to match door.

F. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

G. Hood: Stainless steel.

1. Shape: Round.

H. Sill Configuration: Integral metal sill.

I. Locking Devices: Equip door with locking device assembly.

1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside with thumb turn.


K. Curtain Accessories: Equip door with smoke seals weatherseals astragal push/pull handles pull-down strap poll hook automatic closing device.

L. Door Finish:

1. Stainless-Steel Finish: No. 4 (polished directional satin).
2.3 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate coiling counter-door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Stainless-Steel Door Curtain Slats: ASTM A 666, Type 304; sheet thickness of 0.025 inch; and as required.
2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.4 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Stainless Steel: 0.025-inch-thick stainless-steel sheet, Type 304, complying with ASTM A 666.

B. Integral Frame, Hood, and Fascia: Welded sheet metal assembly of the following sheet metal(s):

1. Stainless Steel: Type 304, complying with ASTM A 666.

2.5 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Cylinders specified in Section 087100 "Door Hardware" or standard with manufacturer and keyed to building keying system.
2. Keys: Two for each cylinder.

2.6 CURTAIN ACCESSORIES

A. Astragal: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

B. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches high.
2.7 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.8 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

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.

2.10 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. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.
PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install coiling counter doors, hoods, controls, and operators at the mounting locations indicated for each door.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide tight fit around entire perimeter.

3.5 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.
3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083313
SECTION 083323 - OVERHEAD COILING DOORS

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. Insulated service doors.

B. Related Requirements:
   1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.
   1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
   3. Include description of automatic closing device and testing and resetting instructions.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
   1. Include plans, elevations, sections, and mounting details.
   2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
   4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
   5. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
   6. Include diagrams for power, signal, and control wiring.

C. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
   1. Curtain slats.
2. Bottom bar with sensor edge.
3. Guides.
5. Hood.
6. Locking device(s).
7. Include similar Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling doors 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 for both installation and maintenance of units required for this Project.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.

1. Design Wind Load: As indicated on Drawings.
3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

B. Windborne-Debris Impact Resistance: Provide impact-protective overhead coiling doors that pass missile-impact and cyclic-pressure tests according to ASTM E 1996 for Wind Zone indicated on the Structural Drawings.

1. Large-Missile Test: For overhead coiling doors located within 30 feet of grade.
2. Small-Missile Test: For overhead coiling doors located more than 30 feet above grade.
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

2.3 DOOR ASSEMBLY

A. Service Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Cornell Iron Works, Inc.; MGH Motor Operated Rolling Door, or comparable product by one of the following:
   a. Cookson Company.
   b. McKeon Rolling Steel Door Company, Inc.
   c. Overhead Door Corporation.
   d. Wayne-Dalton Corp.

B. Operation Cycles: Door components and operators capable of operating for not less than 50,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1. Include tamperproof cycle counter.

C. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. at 15 and 25 mph when tested according to ASTM E 283.


E. Curtain R-Value: 6.0 deg F x h x sq. ft./Btu.

F. Door Curtain Material: Stainless steel Aluminum.

G. Door Curtain Slats: Flat profile slats of 3-1/4-inch center-to-center height.

1. Insulated-Slat Interior Facing: Metal.
2. Gasket Seal: Manufacturer’s standard continuous gaskets between slats.

H. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from hot-dip galvanized steel and finished to match door.

I. Curtain Jamb Guides: Galvanized steel Stainless steel Aluminum with exposed finish matching curtain slats.

J. Hood: Match curtain material and finish Galvanized steel Stainless steel Aluminum.

1. Shape: Square.

K. Locking Devices: Equip door with slide bolt for padlock chain lock keeper.

L. Electric Door Operator:

1. Usage Classification: Heavy duty, 25 or more cycles per hour and over 90 cycles per day
   Standard duty, up to 25 cycles per hour and up to 90 cycles per day Light duty, up to 10 cycles per hour.
2. Operator Location: Front of hood.
3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet or lower.
7. Control Station(s): Where shown on Drawings.

M. Curtain Accessories: Equip door with weatherseals push/pull handles pull-down strap.

N. Door Finish:

1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
2. Stainless-Steel Finish: No. 2B (bright, cold rolled) No. 4 (polished directional satin).
3. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.4 MATERIALS, GENERAL

A. 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.

2.5 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 zinc coating; nominal sheet thickness (coated) of 0.028 inch; and as required.
2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 or UL 723. Enclose insulation completely within slat faces.
3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum steel thickness of 0.010 inch.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain[, and a continuous bar for holding windlocks].
2.6 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Galvanized Steel: Nominal 0.028-inch-thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653/A 653M.

2.7 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.8 CURTAIN ACCESSORIES

A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.

B. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.

1. At door head, use 1/8-inch-thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.

2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene.

C. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

D. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches high.

2.9 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer’s standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer’s standard mounting brackets of either cast iron or cold-rolled steel plate.

2.10 ELECTRIC DOOR OPERATORS

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

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Chamberlain Group, Inc. (The).

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

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Location(s): Operator location indicated for each door.

1. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

2. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door and connected to door drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.

D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated.

1. Electrical Characteristics:

   a. Phase: Polyphase.
   b. Volts: 460 V.
   c. Hertz: 60.

2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
3. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
   a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained or constant pressure on close button.

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

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


I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

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

K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

L. Portable Radio-Control System: Consisting of one of the following per door operator:

   1. Three-channel universal coaxial receiver to open, close, and stop door.
   2. Portable control device to open and stop door may be momentary-contact type; control to close door shall be sustained- or constant-pressure type.
2.11 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.

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.

2.12 STEEL AND GALVANIZED-STEEL FINISHES

A. Factory Prime Finish: Manufacturer’s standard primer, compatible with field-applied finish. Comply with coating manufacturer’s written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

B. Baked-Enamel or Powder-Coat Finish: Manufacturer’s standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer’s written instructions for cleaning, pretreatment, application, 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 substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer’s written instructions and as specified.

B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Power-Operated Doors: Install according to UL 325.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.
1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

1. Adjust exterior doors and components to be weather-resistant.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide tight fit around entire perimeter.

3.5 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323
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. GSA Class 5-A armory vault door assemblies

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

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 vault door assemblies.
   B. Shop Drawings: For vault door assemblies.
      1. Include plans, elevations, sections, and attachment details.
      2. Show operational clearances and coordination of frame with designed wall thicknesses.
      3. Show installation of anchorages for vault door frames.
   C. Setting Drawings: For anchorages, including sleeves, inserts, anchor bolts, and items with integral anchors that are to be embedded in supporting construction.
   D. Samples: For each exposed product and for each color and texture specified, in manufacturer’s standard sizes.

1.4 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Product Test Reports: For each vault door, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For vault door assemblies to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
   a. Keying and combination information.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
   1. Maintenance Proximity: Not more than [2] hours' normal travel time from Installer's place of business to Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver vault door assemblies wrapped and crated to provide protection during transit and Project-site storage. Use vented plastic.

B. Deliver keys to Owner by registered mail or overnight package service.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install vault door assemblies until spaces are enclosed and weathertight, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for building occupants during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 GSA CLASS 5-A ARMORY VAULT DOOR ASSEMBLIES

A. Vault Door Assembly: Qualification tests on doors submitted for approval for inclusion on the applicable Qualified Products List (QPL) and any re-testing that may be required shall be performed by a testing agency specifically designated by the General Services Administration.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      b. Diebold, Incorporated
      c. Hamilton Safe.
      d. International Vault, Inc.
      e. Overlay Door Company

B. Vault Door Rating: GSA Class 5-A; armory door shall be resistant to 30 man-minutes surreptitious entry, 10 man-minutes forced entry.
C. Vault Door shall comply with requirements of Federal Specifications FF-L-2937 Amendment 2 and QPL-FF-L 2937.

D. Escape Device: Each vault door shall have an escape device which shall be permanently installed on the inside face of the door. The device shall permit ready escape for persons locked inside the vault area. Access to the device shall only be from the inside the vault, and its design shall be such that under normal operating conditions it cannot be active from the outside. A decal shall be permanently affixed to the inside face of the door frame outlining, in easily read letters, completely understandable instructions for activating the device to open the door. Neither the design of the device not its installation shall affect the door's resistance to entry techniques. The escape device shall allow the door to be returned to the fully secure condition following egress from the vault.

E. Identification Labels: Each door supplied under a contract or order under this specification shall bear metallic labels showing the information specified hereunder. Labels shall be attached with durable adhesive sufficient to preclude removing the label without destroying the label. Regardless of the method used, the label attachment shall not degrade the door security.

F. General Services Administration Label: The label shall be affixed to the outside face of the door. The label shall have a silver background and red letters not less than 3 mm in height. The label shall show the following:

1. GENERAL SERVICES ADMINISTRATION
2. APPROVED SECURITY VAULT DOOR
3. MANUFACTURERS NAME

G. Door: Fabricated from all-welded, insulated steel sheet construction; overall thickness not less than 3-1/4 inches thick; with jambs and head shaped to interlock with frame.

1. Clear Opening Size: As indicated on Drawings.
2. Factory-Installed Features:
   a. Door-contact alarm device.
   b. Emergency vault ventilator complying with UL 680, with same burglary classification as vault door.
   c. In-door telephone jack.
   d. Stainless-steel back panel to conceal timelock.
   e. Can be side lifted.
   f. Optical device.

H. Frame: Designed for nongrout installation; adjustable to accommodate wall thicknesses.

I. Hardware and Accessories:

1. Hinges: Manufacturer’s standard.
2. Handle: Manufacturer’s standard.
3. Combination Locks: UL 768, Group 1, four-wheel mechanical type capable of no fewer than one million possible combinations.
   a. Quantity: Two per door.
4. Timelock: UL 887 listed, three-movement, 144-hour timelock.
5. Day Guard Lock: Secures locking bar in open position to prevent lock in of personnel.
7. Door Stop: Low-profile style.
8. Trim: Stainless-steel, chromium-plated steel, or other trim standard with vault door manufacturer.
9. Optical device.
10. Exterior lever handle.

J. Finish: Manufacturer’s standard factory-applied, baked-on coating finish applied to door, frame, and wall flanges.
   1. Color: As selected by Architect from manufacturer’s full range.

K. Day Gate: Full width of door opening and designed to restrict entry through vault door; with piano-type or self-closing gravity hinges.
   1. Construction: Manufacturer’s standard.
   2. Lock: Cylinder-type lock, controlled by key on nonsecure side and by knob on secure side.
   3. Features:
      a. Deal window.

L. Finish: Manufacturer’s standard stainless-steel clad finish applied to door, frame, and wall flanges.
   1. Color: As selected by Architect from manufacturer’s full range.

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. 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 PREPARATION

A. Coordinate size and location of vault door assemblies with supporting construction, and furnish anchoring devices with templates, diagrams, and instructions for their installation.

B. Provide temporary shoring or bracing of floors while transporting vault door assemblies to final location as required to prevent surface damage to floors or deflection in excess of design loads.
3.3 INSTALLATION

A. Install vault door assemblies complete with doors, frames, and accessories and according to requirements of assemblies' UL listing.

B. Set vault door frames accurately in position; plumb, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

3.4 ADJUSTING AND CLEANING

A. Adjust vault door hardware and operating mechanism to function smoothly, and lubricate as recommended by manufacturer.

B. Remove and replace work that cannot be cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

C. Touchup Painting: Immediately after erection, clean abraded areas of shop paint; paint exposed areas with same material used for shop painting.

1. Comply with Section 099123 "Interior Painting."

END OF SECTION 083459
SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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 storefront framing.
   2. Storefront framing for window walls.
   4. Exterior manual-swing entrance doors and door-frame units.

B. Related Requirements:
   1. Division 07 Section "Joint Sealers".
   2. Division 08 Section "Glazing" for types of glazing required for field and factory installed glass.

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 construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. LEED Submittals:
   1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.

C. 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 full-size 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.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
5. Flashing and drainage.

G. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

H. 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.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.
1.7 QUALITY ASSURANCE

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

B. 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.

1.8 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.
2. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

A. Special Warranty: Manufacturer Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration created by wind and thermal and structural movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Water penetration through fixed glazing and framing areas.
   e. Failure of operating components.

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

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.

B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts 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. Thermal stresses transferring to building structure.
   b. Glass breakage.
   c. Noise or vibration created by wind and thermal and structural movements.
   d. Loosening or weakening of fasteners, attachments, and other components.
   e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.

2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite 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 1/360 of clear span or 1/8 inch, whichever is smaller.
   a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

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: 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..

2. Entrance Doors:
   a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
   b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

G. 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..

H. 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 6.24 lbf/sq. ft..

2. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

I. Interstory Drift: Accommodate design displacement of adjacent stories indicated.

1. Design Displacement: As indicated on Drawings.

2. Test Performance: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.

J. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to [ASCE/SEI 7] <Insert requirement>.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.

2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.7 at design displacement[ and 1.5 times the design displacement].
K. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 15 as determined according to NFRC 500.

L. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows.


M. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone established by the International Building Code.

1. Large-Missile Test: For glazed openings located within 30 feet of grade.

N. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
   
   a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
   b. Low Exterior Ambient-Air Temperature: 0 deg F.
   c. Interior Ambient-Air Temperature: 75 deg F.

O. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.
2. Designed to produce tensile or shear stress of less than 20 psi.

P. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed storefront system without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements, provide Kawneer 451T Series for exterior and 450 Series for Interior or comparable product by one of the following:
1. EFCO Corporation.
2. Tubelite.
3. United States Aluminum.
4. YKK AP America Inc.

B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing spandrel panels venting windows 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.
   2. 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. 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.

2.4 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
   1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-2-inch overall thickness, with minimum 0.188-inch-2-inch to 2-1/4-inch overall thickness, 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.
a. Thermal Construction: **High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.**

2. Door Design: As indicated Medium stile; 3-1/2-inch nominal width.
   a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.
   1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and .
   2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
   3. Opening-Force Requirements:
      a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbfto set the door in motion and not more than 15 lbf to open the door to its minimum required width.
      b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

C. Pivot Hinges: BHMA A156.4, Grade 1.
   1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

D. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
   1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
   2. Exterior Hinges: **Stainless steel, with stainless-steel pin.**
   3. Quantities:
      a. For doors up to 87 inches high, provide three hinges per leaf.
      b. For doors more than 87 and up to 120 inches high, provide four hinges per leaf.

E. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.

F. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.


H. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
I. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

J. Operating Trim: BHMA A156.6.

K. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

L. Concealed Overhead Holders: BHMA A156.8, Grade 1.

M. Surface-Mounted Holders: BHMA A156.16, Grade 1.

N. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

O. 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.

P. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

Q. Silencers: BHMA A156.16, Grade 1.

R. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

S. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.6 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Comply with Section 088000 "Glazing."

C. Glazing Sealants: Comply with Section 088000 "Glazing."

D. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in storefront system indicated.
E. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.


2.7 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. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.8 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. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Storefront Framing: Fabricate components for assembly using shear-block system screw-spline system head-and-sill-receptor system with shear blocks at intermediate horizontal members Insert system.

G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
   1. At exterior doors, provide compression weather stripping at fixed stops.

H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
   1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
   2. At exterior doors, provide weather sweeps applied to door bottoms.

I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.10 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

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 nonmovement 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 operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

G. 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.

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts 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.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
   a. Perform a minimum of two tests in areas as directed by Architect.
   b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.


   1. Test a minimum of two areas on each building facade.
   2. Repair installation areas damaged by testing.

D. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware:

   1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial Maintenance Service: Beginning at Substantial Completion, provide [six] <Insert number> months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

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 glazed aluminum curtain walls including perimeter trims, accessories, shim and attachments and perimeter sealing of framing.

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 construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. LEED Submittals:

   1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.

C. Shop Drawings: For glazed aluminum curtain walls. 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 full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, 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.
D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
5. Flashing and drainage.

F. 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.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.

C. Product Test Reports: For glazed aluminum curtain walls, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.

E. Source quality-control reports.

F. Field quality-control reports.

G. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
B. Laboratory Mockup Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated [and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025].

C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated [and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025].

D. Materials to be supplied by single source manufacturer who has been established in U.S. for a minimum of 25 years. Manufacturer who can supply all corresponding framing systems including storefront and doors. No multiple manufacture supplied products between framing product types.

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. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of curtain wall assemblies.

1.8 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.
2. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION LABORATORY MOCKUPS

A. Preconstruction Testing Service: Engage a qualified testing agency to perform testing on preconstruction laboratory mockups.

B. Build preconstruction laboratory mockups at testing agency facility; use personnel, products, and methods of construction that will be used at Project site.

1. Size and Configuration: As indicated on Drawings.
2. Notify Architect seven days in advance of the dates and times when preconstruction laboratory mockups will be constructed and tested.
C. Preconstruction Laboratory Mockup Testing Program: Test preconstruction laboratory mockups according to requirements in "Performance Requirements" Article. Perform the following tests in the following order:

1. Structural: ASTM E 330 at 50 percent of positive test load.
3. Water Penetration under Static Pressure: ASTM E 331.
5. Structural: ASTM E 330 at 100 percent of positive and negative test loads. Repeat the following:
   b. Water Penetration under Static Pressure: ASTM E 331.

6. Interstory Drift: AAMA 501.4 at 100 percent of design displacement. Repeat the following:
   b. Water Penetration under Static Pressure: ASTM E 331.

7. Vertical Interstory Movement: AAMA 501.7. Repeat the following:
   b. Water Penetration under Static Pressure: ASTM E 331.

8. Thermal Cycling: According to AAMA 501.5. Repeat the following:
   b. Water Penetration under Static Pressure: ASTM E 331.

9. Structural: ASTM E 330 at 100 and 150 percent of positive and negative test loads. Repeat the following:
   b. Water Penetration under Static Pressure: ASTM E 331.

1.10 WARRANTY

A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration created by wind and thermal and structural movements.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Water penetration through fixed glazing and framing areas.
   e. Failure of operating components.

2. Warranty Period: 10 years from date of Substantial Completion.
B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," 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. Thermal stresses transferring to building structure.
   b. Glass breakage.
   c. Noise or vibration created by wind and thermal and structural movements.
   d. Loosening or weakening of fasteners, attachments, and other components.
   e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite 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 1/360 of clear span or 1/8 inch, whichever is smaller.

E. Structural: Test according to ASTM E 330 as follows:
When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.

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.

Test Durations: As required by design wind velocity, but not less than 10 seconds.

### 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 1.57 lbf/sq. ft.

### 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 15 lbf/sq. ft.

### 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 15 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.

### Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.

### Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.

2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 as determined according to NFRC 200.

3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than \[15 \leq R < 45\] as determined according to NFRC 500.

### Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone established by the International Building Code.

1. Large-Missile Test: For glazed openings located within 30 feet of grade.
2. Small-Missile Test: For glazed openings located more than 30 feet above grade.

L. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.  
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
   a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.  
   b. Low Exterior Ambient-Air Temperature: 0 deg F.

M. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.  
2. Designed to produce tensile or shear stress of less than 20 psi.

N. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.  
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer an Alcoa company 1600 Series or comparable product by one of the following:

1. EFCO Corporation.  
2. Tubelite.  
3. United States Aluminum.  
5. YKK AP America Inc., YHC 300

B. Source Limitations: Obtain all components of curtain wall system, including framing 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.

2. Glazing System: Retained mechanically with gaskets on four sides.  
5. Fabrication Method: Either factory- or field-fabricated system.

B. Pressure Caps: Manufacturer’s standard aluminum components that mechanically retain glazing.
1. Include snap-on aluminum trim that conceals fasteners.

C. Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. 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.
3. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.
4. 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 or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
5. Pressure Plate: Pressure plate shall be aluminum and fastened to the mullion with stainless steel screws.
6. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
7. Sealant: For sealants required within fabricated sloped glazing system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
8. Thermal Barrier: Thermal separator shall be extruded of a silicone compatible PVC (Poly Vinyl Chloride).
9. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed sloped glazing members are nominal and in compliance with AA Aluminum Standards and Data.

2.4 ENTRANCES

A. Entrances: Comply with Section 084113 "Aluminum-Framed Entrances and Storefronts."
2.5 GLAZING

A. Glazing: 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. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less.

E. Sealants used inside the weatherproofing system 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."

F. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.

G. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.

2.6 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. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.7 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. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

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 manufacturer’s standard assembly method.

F. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Prepare surfaces that are in contact structural sealant according to sealant manufacturer’s written instructions to ensure compatibility and adhesion.
3. Preparation includes, but is not limited to, cleaning and priming surfaces.
4. Seal joints watertight unless otherwise indicated.
5. Install glazing to comply with requirements in Section 088000 "Glazing."

G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
2.9 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

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 nonmovement 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 operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. 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.

G. 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.

H. Glazing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9” (228.6) on center.

I. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

3.4 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.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Test Area: Perform tests on representative areas of glazed aluminum curtain walls.

C. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.
   1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
a. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

2. Air Infiltration: ASTM E 783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
   a. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

3. Water Penetration: ASTM E 1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.

D. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
   1. Test a minimum of two areas on each building facade.
   2. Repair installation areas damaged by testing.

E. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.6 ADJUSTING, CLEANING AND PROTECTION

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum sloped glazing system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 084413
SECTION 084523 - FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

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-framed assemblies incorporating fiberglass-sandwich panels as follows:

1. Roof assemblies.
2. Skylight 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. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum components of panel assemblies.

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. Shop Drawings: For panel assemblies.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include details of provisions for assembly expansion and contraction and for draining moisture within the assembly to the exterior.

D. Samples: In manufacturer's standard size.

1. For each type of fiberglass-sandwich panel.
2. For each type of exposed finish for framing members.

E. Fabrication Samples: Of each framing system intersection and adjacent panels, made from 12-inch lengths of full-size framing members and showing details of the following:
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

1. Joinery.
2. Anchorage.
4. Fiberglass-sandwich panels.
5. Flashing and drainage.

F. Delegated-Design Submittal: For panel assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.
B. Product Test Reports: For each fiberglass-sandwich-panel assembly, for tests performed by a qualified testing agency.
C. Evaluation Reports: For fiberglass-sandwich-panel assemblies from ICC-ES.
D. Field quality-control reports.
E. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For panel assemblies to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: For fiberglass-sandwich panels, a qualified manufacturer whose facilities, processes, and products are monitored by an independent, accredited quality-control agency for compliance with applicable requirements in ICC-ES AC04 or ICC-ES AC177.
B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical panel assemblies as shown on Drawings.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of panel assemblies that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Structural failures including, but not limited to, excessive deflection.
   b. Deterioration of metals[, metal finishes,] and other materials beyond normal weathering.
   c. Water leakage.

2. Warranty Period: Five years from date of Substantial Completion.

B. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace fiberglass-sandwich panels that exhibit defects in materials or workmanship within specified warranty period.

1. Defects include, but are not limited to, the following:
   a. Fiberbloom.
   b. Delamination of coating, if any, from exterior face sheet.
   c. Color change exceeding requirements.
   d. Delamination of panel face sheets from panel cores.

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

C. Special Aluminum-Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design fiberglass-sandwich-panel assemblies.

B. Structural Loads: As indicated on Drawings.

C. Deflection Limits:

1. Overhead Panel Assemblies: Limited to 1/180 of clear span for each assembly component.

D. Structural-Test Performance: Provide panel assemblies tested according to ASTM E 330, as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not show evidence of deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not show evidence of material failures, structural distress, and 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. Windborne-Debris Impact Resistance: Passes ASTM E 1886 missile-impact and cyclic-pressure tests in accordance with ASTM E 1996 for Wind Zone 4 for basic protection.
   1. Large-Missile Test: For glazing located within 30 feet of grade.
   2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.

F. Water Penetration under Static Pressure: Provide panel assemblies 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 15 lbf/sq. ft.

G. Water Penetration under Dynamic Pressure: Provide panel assemblies that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
   1. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water that is controlled by flashing and gutters and drained to the exterior, or water that cannot damage adjacent materials or finishes.

H. Thermal Movements: Allow for thermal movements from ambient- and surface-temperature changes. 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.

I. Energy Performance: Provide panel assemblies with performance properties specified, as indicated in manufacturer’s published test data, based on procedures indicated below and certified and labeled according to NFRC:
   1. Thermal Transmittance (U-Factor): Fixed glazing and framing areas shall have U-factor of not more than 0.80 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
   2. Solar Heat Gain Coefficient (SHGC): Fixed glazing and framing areas shall have a SHGC of no greater than 0.6 as determined according to NFRC 200.
   3. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of [0.30 cfm/sq. ft.] of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 1.57 lbf/sq. ft.

2.2 FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

A. Fiberglass-Sandwich-Panel Assemblies: Translucent assemblies that are supported by aluminum framing and glazed with fiberglass-sandwich panels.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Kalwall Corporation.
      b. Major Industries, Inc.
2.3 FIBERGLASS-SANDWICH PANELS

A. Fiberglass-Sandwich Panels: Uniformly colored, translucent, thermoset, fiberglass-reinforced-polymer face sheets bonded to both sides of a grid core.


C. Grid Core: Mechanically interlocked, extruded-aluminum I-beams, with a minimum flange width of 7/16 inch.
   1. Extruded Aluminum: ASTM B 221, in alloy and temper recommended in writing by manufacturer.
   2. I-Beam Construction: Thermally broken, extruded aluminum.

D. Exterior Face Sheet:
   1. Thickness: 0.070 inch.
   2. Color: As selected by Architect from manufacturer’s full range.
   3. Protective Weathering Surface: [Manufacturer’s standard] [Integral, embedded-glass erosion barrier] [Surface-applied, polyvinyl-fluoride film not less than 1.0 mils thick].

E. Interior Face Sheet:
   1. Thickness: 0.060 inch.
   2. Color: As selected by Architect from manufacturer’s full range.

F. Fiberglass-Sandwich-Panel Adhesive: Manufacturer’s standard for permanent adhesion of facings to cores.

G. Panel Strength:
   1. Maximum Panel Deflection: 3-1/2 inches when a 4-by-12-foot panel is tested according to ASTM E 72 at 34 lbf/sq. ft., with a maximum 0.090-inch set deflection after five minutes.
   2. Panel Support Strength: Capable of supporting, without failure, a 300-lbf concentrated load when applied to a 3-inch- diameter disk according to ASTM E 661.

H. Panel Performance:
   1. Self-Ignition Temperature: 650 deg F or more according to ASTM D 1929.
   2. Smoke-Developed Index: 450 or less according to ASTM E 84, or 75 or less according to ASTM D 2843.
   3. Combustibility Classification: [Class CC1] [Class CC2] based on testing according to ASTM D 635.
   4. Roof-Covering Classification: [Class B] [Class B, Burning Brand Test] [Class C] according to ASTM E 108 or UL 790.
   5. Interior Finish Classification: [Class A] [Class B] [Class C] based on testing according to ASTM E 84.
   6. Color Change: Not more than 3.0 units Delta E, when measured according to ASTM D 2244, after outdoor weathering compliant with procedures in ASTM D 1435.
      a. Outdoor Weathering Conditions: Sixty months in southern Florida.
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

7. Impact Resistance: No fracture or tear at impact of [60 ft. x lbf] [70 ft. x lbf] [230 ft. x lbf] by a 3-1/4-inch- diameter, 5-lb freefalling ball according to UL 972 test procedure.
8. Haze Factor: Greater than 90 percent when tested according to ASTM D 1003.

2.4 ALUMINUM FRAMING SYSTEMS

A. Components: Manufacturer’s standard extruded-aluminum members of thickness required and reinforced as required to support imposed loads.

B. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
   2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.

C. Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.

D. Fasteners and Accessories: Manufacturer’s standard, corrosion-resistant, nonstaining, and nonbleeding fasteners and accessories; compatible with adjacent materials.
   1. At closures, retaining caps, or battens, use ASTM A 193, 300 series stainless-steel screws.
   2. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   3. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.

E. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.


G. Concealed Flashing: Corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

H. Exposed Flashing and Closures: Aluminum sheet not less than <insert dimension> thick, finished to match framing.

I. Framing Gaskets: Manufacturer’s standard.

J. Frame-System Sealants: As recommended in writing by manufacturer.
   1. Sealant shall have a VOC content of 250 g/L or less.
   2. Sealant 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.”
K. Corrosion-Resistant 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.

2.5 FABRICATION

A. Frame System Fabrication:
   1. Fabricate components that, when assembled, have the following characteristics:
      a. Profiles that are sharp, straight, and free of defects or deformations.
      b. Accurately fitted joints with ends coped or mitered.
      c. Internal guttering systems or other means to drain water passing through joints, and moisture migrating within assembly to exterior.
   2. Fabricate sill closures with weep holes and for installation as continuous component.
   3. Reinforce components as required to receive fastener threads.

B. Panel Fabrication: Factory assemble and seal panels.
   1. Laminate face sheets to grid core under a controlled process using heat and pressure to produce straight adhesive bonding lines that cover width of core members and that have sharp edges.
      a. White spots indicating lack of bond at intersections of grid-core members are limited in number to four for every 40 sq. ft. of panel and limited in diameter to 3/64 inch.
   2. Fabricate with grid pattern that is symmetrical about centerlines of each panel.
   3. Fabricate panel to allow condensation within panel to escape.
   4. Reinforce panel corners.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. General: Comply with manufacturer’s written instructions.
1. Do not install damaged components.
2. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
3. Rigidly secure nonmovement joints.
4. Install anchors with separators and isolators to prevent metal corrosion, electrolytic deterioration, and immobilization of moving joints.
5. Seal joints watertight unless otherwise indicated.

B. Metal Protection: Where aluminum components will contact dissimilar materials, protect against galvanic action by painting contact surfaces with corrosion-resistant coating or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.

C. Install components plumb and true in alignment with established lines and elevations.

D. Skylight Assemblies: Install continuous aluminum sill closures with weatherproof expansion joints and locked and sealed corners. Locate weep holes at rafters. Install components to drain water passing through joints and moisture migrating within assembly to exterior.

E. Erection Tolerances: Install panel assemblies to comply with the following maximum tolerances:

   1. Alignment: Limit offset from true alignment to 1/32 inch where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches; otherwise, limit offset to 1/8 inch.
   2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet, but no greater than 1/2 inch over total length.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: [Owner will engage] [Engage] a qualified testing agency to perform tests and inspections.

   1. Water-Spray Test: Before installation of interior finishes has begun, panel assemblies shall be tested according to AAMA 501.2 and shall not show evidence of water penetration.
   2. Water Penetration under Static Pressure: Before installation of interior finishes has begun, areas shall be tested according to ASTM E 1105.

      a. Test Procedures: Test under uniform and cyclic static-air pressure.
      b. Static-Air-Pressure Difference: <Insert pressure>.
      c. Water Penetration: None.

B. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

END OF SECTION 084523
SECTION 087100 – DOOR HARDWARE

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 commercial door hardware for the following:
   1. Swinging doors.
   2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Cylinders specified for doors in other sections.

C. Related Sections:
   1. Division 08 Section “Door Hardware Schedule”.
   2. Division 08 Section “Hollow Metal Doors and Frames”.
   3. Division 08 Section “Flush Wood Doors”.
   4. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
   5. Division 28 Section “Access Control”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:
   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies
1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.
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Project Number T1809-01

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 5 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
DOOR HARDWARE

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures.

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source.
power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
1. Five years for exit hardware.
2. Twenty five years for manual surface door closer bodies.
3. Five years for motorized electric latch retraction exit devices.
4. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner’s continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
DOOR HARDWARE

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:
   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
   a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
   b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
   a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
   b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:
   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:
   a. Bommer Industries (BO) - LB Series.
b. Hager Companies (HA) - CB Series.
c. Ives (IV).
d. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - TA Series.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:
   a. Bommer Industries (BO).
   b. Hager Companies (HA).
   c. Ives (IV).
   d. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
   e. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Manufacturers:
   a. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE) – EL-CEPT Series.
   b. Securitron (SU) - EL-CEPT Series.
   c. Von Duprin (VD) - EPT-10 Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
   b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - Connector Hand Tool: QC-R003.

2. Manufacturers:
   a. Hager Companies (HA) - Quick Connect.
b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) – QC-C Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:
   a. Burns Manufacturing (BU).
   b. Door Controls International (DC).
   c. Ives (IV).
   d. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer’s designated fastener type as indicated in Hardware Sets.

5. Manufacturers:
   a. Burns Manufacturing (BU).
   b. Hiawatha, Inc. (HI).
   c. Ives (IV).
   d. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
1. Manufacturers:
   a. Stanley Best (BE).
   b. No Substitution.

C. Cylinders: Original manufacturer cylinders complying with the following:
   1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
   4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
   1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.

E. Keying System: Each type of lock and cylinders to be factory keyed.
   1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
   2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
   3. Existing System: Key locks to Owner's existing system.

F. Key Quantity: Provide the following minimum number of keys:
   1. Change Keys per Cylinder: Two (2)
   2. Master Keys (per Master Key Level/Group): Five (5).
   4. Construction Control Keys (where required): Two (2).
   5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide construction master keyed cylinders.


I. Key Registration List (Bitting List):
   1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
   2. Provide transcript list in writing or electronic file as directed by the Owner.

J. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
   1. Manufacturers:
2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.
   1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
   2. Locks are to be non-handed and fully field reversible.
   3. Manufacturers:
      a. Stanley Best (BE) – 9K Series.
      b. No Substitution.

2.7 LOCK AND LATCH STRIKES

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

B. Standards: Comply with the following:
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
   4. Dustproof Strikes: BHMA A156.16.

2.8 ELECTROMAGNETIC LOCKING DEVICES

A. Surface Electromagnetic Locks (Heavy Duty): Electromagnetic locks to be surface mounted type conforming to ANSI A156.23, Grade 1 with minimum holding force strength of 1,200 pounds. Locks to be capable of either 12 or 24 voltage and be UL listed for use on fire rated door assemblies. Electronics are to be fully sealed against tampering and allow exterior weatherproof applications. As indicated in Hardware Sets, provide specified mounting brackets and housings. Power supply to be by the same manufacturer as the lock with combined products having a lifetime replacement warranty.
1. Manufacturers:
   a. Schlage (SC) – M450 Series.
   b. Security Door Controls (SD) – EMLock 1500 Series.
   c. Securitron (SU) – M62 Series.

2.9 ELECTRIC STRIKES

A. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to ANSI/BHMA A156.31, Grade 1, UL listed for both Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike where specified.

   1. Manufacturers:
      a. Folger Adam EDC (FO).
      b. HES (HS).
      c. Security Door Controls (SD).
      d. Von Duprin (VD).

B. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

   1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

   2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

   3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

   4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

   5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware
sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

6. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.

7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
   b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

9. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.


11. Rail Sizing: Provide exit device rails factory sized for proper door width application.

12. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

   1. Manufacturers:
      a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
      b. Sargent Manufacturing (SA) - 80 Series.
      c. Von Duprin (VD) - 35A/98 XP Series.

2.11 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. Size of Units: Comply with manufacturer’s written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - DC8000 Series.
   b. LCN Closers (LC) - 4040 Series.
   c. Sargent Manufacturing (SA) - 351 Series.
   d. Norton Door Controls (NO) - 7500 Series.
   e. Yale Locks and Hardware (YA) - 4400 Series.

C. Door Closers, Surface Mounted (Unitrol): Unitrol arms to have door stop mechanism to absorb dead stop shock on arm and top hinge. Hold-open arms to have a spring loaded mechanism in addition to shock absorber assembly. Arms to be provided with rigid steel main arm and secondary arm lengths proportional to the door width.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - Unitrol Series.
   b. Norton Door Controls (NO) - Unitrol Series.
   c. Yale Locks and Hardware (YA) - Unitrol Series.

2.12 ARCHITECTURAL TRIM

A. Door Protective Trim
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2” less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1” less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
   a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer’s designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Manufacturers:
   a. Burns Manufacturing (BU).
   b. Hager Companies (HA).
   c. Hiawatha, Inc. (HI).
   d. Ives (IV).
   e. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

2.13 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:
   a. Burns Manufacturing (BU).
   b. Hager Companies (HA).
   c. Hiawatha, Inc. (HI).
   d. Ives (IV).
   e. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
1. Manufacturers:
   a. Rixson Door Controls (RF).
   b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   c. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

   1. National Guard Products (NG).
   2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.15 ELECTRONIC ACCESSORIES

A. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.

   1. Manufacturers:

      a. Security Door Controls (SD) - MD-31D Series.
b. Securitron (SU) - XMS Series.

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

1. Manufacturers:
   a. Sargent Manufacturing (SA) – 3280 Series.
   b. Security Door Controls (SD) - DPS Series.
   c. Securitron (SU) - DPS Series.

C. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Manufacturers:
   a. Corbin Russwin Hardware (RU) - BPS Series.
   b. Sargent Manufacturing (SA) - 3500 Series.
   c. Security Door Controls (SD) - 630 Series.
   d. Securitron (SU) - BPS Series.
   e. Von Duprin (VD) - PS.

2.16 FABRICATION

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

2.17 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.


3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

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

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

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

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Manufacturer’s Abbreviations:
1. MK - McKinney  
2. PE - Pemko  
3. RO - Rockwood  
4. SA - SARGENT  
5. BE - dormakaba Best  
6. SU - Securitron  
7. HS - HES  
8. RF - Rixson  
9. NO - Norton

### Hardware Sets

#### Set: 1.0  
Doors: 102a, 119c  
Description: Exterior

<table>
<thead>
<tr>
<th>Item</th>
<th>Model/Details</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Continuous Hinge</td>
<td>CFMSLF-HD1 or CFMSLI-HD1</td>
<td>PE</td>
</tr>
<tr>
<td>1 Exit Device (exit only)</td>
<td>LD 8810</td>
<td>SA</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>UNI7500</td>
<td>NO</td>
</tr>
<tr>
<td>1 Drop Plate</td>
<td>7788</td>
<td>NO</td>
</tr>
<tr>
<td>1 Door Stop</td>
<td>462</td>
<td>RO</td>
</tr>
<tr>
<td>1 Threshold</td>
<td>279x292AFGPK x Opening Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Sweep</td>
<td>345ANB x Door Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Position Switch</td>
<td>DPS-M-BK</td>
<td>SU</td>
</tr>
</tbody>
</table>

Notes: Weatherstripping furnished by Aluminum Door Supplier.

#### Set: 2.0  
Doors: 122b  
Description: Exterior

<table>
<thead>
<tr>
<th>Item</th>
<th>Model/Details</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Continuous Hinge</td>
<td>CFMHD1 x Door Height</td>
<td>PE</td>
</tr>
<tr>
<td>1 Exit Device (storeroom)</td>
<td>LC 16 8804 P5B</td>
<td>SA</td>
</tr>
<tr>
<td>2 Cylinder</td>
<td>Housing to match existing</td>
<td>US26D</td>
</tr>
<tr>
<td>2 Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D</td>
</tr>
<tr>
<td>2 Construction Core</td>
<td>To fit Housing</td>
<td>US26D</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>UNI7500 SN-134</td>
<td>NO</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D</td>
</tr>
<tr>
<td>1 Door Stop</td>
<td>462</td>
<td>RO</td>
</tr>
<tr>
<td>1 Threshold</td>
<td>279x292AFGPK x Opening Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Gasketing</td>
<td>S773D (Head &amp; Jambs)</td>
<td>PE</td>
</tr>
<tr>
<td>1 Rain Guard</td>
<td>346C x Overall Frame Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Sweep</td>
<td>345ANB x Door Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Position Switch</td>
<td>DPS-M-BK</td>
<td>SU</td>
</tr>
</tbody>
</table>

#### Set: 3.0  
Doors: 123  
Description: Exterior
<table>
<thead>
<tr>
<th>Item Description</th>
<th>Model</th>
<th>Finish</th>
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</thead>
<tbody>
<tr>
<td>2 Continuous Hinge</td>
<td>CFMHD1</td>
<td>PE</td>
</tr>
<tr>
<td>1 Exit Device (exit only)</td>
<td>MD8610</td>
<td>US32D</td>
</tr>
<tr>
<td>1 Concealed Vert Rod Exit</td>
<td>LC MD8606 ETL</td>
<td>US32D</td>
</tr>
<tr>
<td>1 Cylinder</td>
<td>Housing to match existing</td>
<td>US26D</td>
</tr>
<tr>
<td>1 Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D</td>
</tr>
<tr>
<td>1 Construction Core</td>
<td>To fit Housing</td>
<td>US26D</td>
</tr>
<tr>
<td>2 Surface Closer</td>
<td>UNI7500 SN-134</td>
<td>689</td>
</tr>
<tr>
<td>2 Kick Plate</td>
<td>K1050 10&quot; x 1&quot; LDW CSK BEV</td>
<td>US32D</td>
</tr>
<tr>
<td>2 Door Stop</td>
<td>462</td>
<td>US2C</td>
</tr>
<tr>
<td>1 Threshold</td>
<td>279x292AFGPK x Opening Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Gasketing</td>
<td>S773D (Head &amp; Jambs)</td>
<td>PE</td>
</tr>
<tr>
<td>1 Rain Guard</td>
<td>346C x Overall Frame Width</td>
<td>PE</td>
</tr>
<tr>
<td>2 Sweep</td>
<td>345ANB x Door Width</td>
<td>PE</td>
</tr>
<tr>
<td>2 Astragal</td>
<td>305CN x Door Height</td>
<td>PE</td>
</tr>
<tr>
<td>2 Position Switch</td>
<td>DPS-M-BK</td>
<td>SU</td>
</tr>
</tbody>
</table>

**Set: 4.0**

Doors: 126

Description: Exterior

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Model</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Continuous Hinge</td>
<td>CFMHD1 PT x Door Height</td>
<td>PE</td>
</tr>
<tr>
<td>1 Exit Device (storeroom)</td>
<td>LC 16 55 56 8804 PSB</td>
<td>US32D</td>
</tr>
<tr>
<td>2 Cylinder</td>
<td>Housing to match existing</td>
<td>US26D</td>
</tr>
<tr>
<td>2 Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D</td>
</tr>
<tr>
<td>2 Construction Core</td>
<td>To fit Housing</td>
<td>US26D</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D</td>
</tr>
<tr>
<td>1 Door Stop</td>
<td>462</td>
<td>US2C</td>
</tr>
<tr>
<td>1 Threshold</td>
<td>279x292AFGPK x Opening Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Gasketing</td>
<td>S773D (Head &amp; Jambs)</td>
<td>PE</td>
</tr>
<tr>
<td>1 Rain Guard</td>
<td>346C x Overall Frame Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Sweep</td>
<td>345ANB x Door Width</td>
<td>PE</td>
</tr>
<tr>
<td>1 Electric Power Transfer</td>
<td>EL-CEPT</td>
<td>SU</td>
</tr>
<tr>
<td>1 ElectroLynx Harness</td>
<td>QC-C1500P</td>
<td>MK</td>
</tr>
<tr>
<td>1 ElectroLynx Harness</td>
<td>QC-C Length Required</td>
<td>MK</td>
</tr>
<tr>
<td>1 Position Switch</td>
<td>DPS-M-BK</td>
<td>SU</td>
</tr>
<tr>
<td>1 Power Supply</td>
<td>BPS-24-1</td>
<td>SU</td>
</tr>
</tbody>
</table>

Notes: Card reader furnished by Owner.

Operation: Door is normally closed and locked. When a valid credential is presented to the wall mounted card reader the latch on the exit devices will retract and you can pull the door open. When the door comes back closed the latch will project and the door will be locked. There will be a REX or request to exit switch built into the push pad on the exit device. You can always exit out of the space by pushing on the push pad on the exit device and exiting out of the space.

**Set: 5.0**

Doors: 126a

Description: Exterior

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Model</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cylinder</td>
<td>Housing to match existing</td>
<td>US26D</td>
</tr>
<tr>
<td>1 Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D</td>
</tr>
</tbody>
</table>
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

<table>
<thead>
<tr>
<th>Set: 6.0</th>
<th>Doors: 112, 118, 119d, 122</th>
<th>Description: Locker</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D MK</td>
</tr>
<tr>
<td>2 Exit Device (classroom)</td>
<td>LC NB8713 ETL</td>
<td>US32D SA</td>
</tr>
<tr>
<td>2 Cylinder</td>
<td>Housing to match existing</td>
<td>US26D BE</td>
</tr>
<tr>
<td>2 Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D BE</td>
</tr>
<tr>
<td>2 Construction Core</td>
<td>To fit Housing</td>
<td>US26D BE</td>
</tr>
<tr>
<td>2 Surface Closer</td>
<td>CPS7500</td>
<td>689 NO</td>
</tr>
<tr>
<td>2 Kick Plate</td>
<td>K1050 10&quot; x 1&quot; LDW CSK BEV</td>
<td>US32D RO</td>
</tr>
<tr>
<td>2 Astragal</td>
<td>18041CNB x Door Height</td>
<td>PE</td>
</tr>
<tr>
<td>2 Silencer</td>
<td>608</td>
<td>RO</td>
</tr>
</tbody>
</table>

| Notes: Balance of hardware furnished by Overhead Coiling Door Supplier. |

<table>
<thead>
<tr>
<th>Set: 6.1</th>
<th>Doors: 102b</th>
<th>Description: Lobby</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D MK</td>
</tr>
<tr>
<td>1 Exit Device (classroom)</td>
<td>LC 16 55 56 NB8706 ETL</td>
<td>US32D SA</td>
</tr>
<tr>
<td>1 Exit Device (classroom)</td>
<td>LC 16 55 NB8710 ETL</td>
<td>US32D SA</td>
</tr>
<tr>
<td>3 Cylinder</td>
<td>Housing to match existing</td>
<td>US26D BE</td>
</tr>
<tr>
<td>3 Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D BE</td>
</tr>
<tr>
<td>3 Construction Core</td>
<td>To fit Housing</td>
<td>US26D BE</td>
</tr>
<tr>
<td>2 Surface Closer</td>
<td>CPS7500</td>
<td>689 NO</td>
</tr>
<tr>
<td>2 Kick Plate</td>
<td>K1050 10&quot; x 1&quot; LDW CSK BEV</td>
<td>US32D RO</td>
</tr>
<tr>
<td>2 Astragal</td>
<td>18041CNB x Door Height</td>
<td>PE</td>
</tr>
<tr>
<td>2 Silencer</td>
<td>608</td>
<td>RO</td>
</tr>
<tr>
<td>2 Electric Power Transfer</td>
<td>EL-CEPT</td>
<td>SU</td>
</tr>
<tr>
<td>2 ElectroLynx Harness</td>
<td>QC-C1500P</td>
<td>MK</td>
</tr>
<tr>
<td>2 ElectroLynx Harness</td>
<td>QC-C Length Required</td>
<td>MK</td>
</tr>
<tr>
<td>2 Position Switch</td>
<td>DPS-W-BK</td>
<td>SU</td>
</tr>
<tr>
<td>1 Power Supply</td>
<td>BPS-24-1</td>
<td>SU</td>
</tr>
</tbody>
</table>

| Notes: Card reader furnished by Owner.       |
| Operation: Doors are normally closed and locked. When a valid credential is presented to the wall mounted card reader the latch on one exit device will release and you can pull the door open. When the door comes back closed the latch will extend and lock the door. There will be a REX or request to exit switch built into the push pad. |

<table>
<thead>
<tr>
<th>Set: 7.0</th>
<th>Doors: 102c</th>
<th>Description: Stairs (Rated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D MK</td>
</tr>
<tr>
<td>1 Exit Device (passage)</td>
<td>12 8815 ETL</td>
<td>US32D SA</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>CPS7500</td>
<td>689 NO</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D RO</td>
</tr>
</tbody>
</table>
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

1  Gasketing                       S88D (Head & Jambs)     PE

**Set: 8.0**
Doors: 103, 104, 104a, 105, 107d, 113, 113a, 114, 115, 122a, 204, 205, 206, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 226
Description: Office, Break

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D  MK</td>
<td></td>
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</tr>
<tr>
<td>Cylindrical Lock (entry)</td>
<td>9K37AB 15D S3</td>
<td>626   BE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Stop</td>
<td>409</td>
<td>US32D RO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silencer</td>
<td>608</td>
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</tbody>
</table>

**Set: 9.0**
Doors: 105a, 114a, 115a
Description: Break, Locker

<table>
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<tr>
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<tr>
<td>Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D  MK</td>
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<tr>
<td>Cylindrical Lock (entry)</td>
<td>9K37AB 15D S3</td>
<td>626   BE</td>
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</tr>
<tr>
<td>Surf Overhead Stop</td>
<td>9 Series</td>
<td>652  RF</td>
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<tr>
<td>Silencer</td>
<td>608</td>
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**Set: 10.0**
Doors: 106
Description: Multi-Purpose

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<tr>
<td>Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D  MK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exit Device (classroom)</td>
<td>LC NB8713 ETL</td>
<td>US32D SA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder</td>
<td>Housing to match existing</td>
<td>US26D  BE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D BE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Core</td>
<td>To fit Housing</td>
<td>US26D BE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Closer</td>
<td>PR7500</td>
<td>689 NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kick Plate</td>
<td>K1050 10&quot; x 1&quot; LDW CSK BEV</td>
<td>US32D RO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Stop</td>
<td>409</td>
<td>US32D RO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Astragal</td>
<td>18041CNB x Door Height</td>
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<td></td>
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</tr>
<tr>
<td>Silencer</td>
<td>608</td>
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**Set: 11.0**
Doors: 106a
Description: Classroom

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<tbody>
<tr>
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<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D  MK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exit Device (classroom)</td>
<td>LC 8813 ETL</td>
<td>US32D SA</td>
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<td></td>
</tr>
<tr>
<td>Cylinder</td>
<td>Housing to match existing</td>
<td>US26D  BE</td>
<td></td>
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</tr>
<tr>
<td>Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D BE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Core</td>
<td>To fit Housing</td>
<td>US26D BE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Closer</td>
<td>CPS7500</td>
<td>689 NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D RO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silencer</td>
<td>608</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Set: 12.0**
Doors: 107e, 109, 119, 124, 230

DOOR HARDWARE 087100 - 22
DOOR HARDWARE

Description: Janitor, Storage

3 Hinge  TA2714 4-1/2" x 4-1/2"  US26D  MK
1 Cylindrical Lock (storeroom)  9K37D 15D S3  626  BE
1 Wall Stop  409  US32D  RO
3 Silencer  608  RO

Set: 13.0
Doors: 107b, 107c, 107f, 107h, 207, 207a

Description: Serving, Kitchen, Conference

3 Hinge  TA2714 4-1/2" x 4-1/2"  US26D  MK
1 Cylindrical Lock (classroom)  9K37R 15D S3  626  BE
1 Wall Stop  409  US32D  RO
3 Silencer  608  RO

Set: 14.0
Doors: 107a

Description: Serving

6 Hinge  TA2714 4-1/2" x 4-1/2"  US26D  MK
2 Flush Bolt  555-12  US26D  RO
1 Dust Proof Strike  570  US26D  RO
1 Cylindrical Lock (classroom)  9K37R 15D S3  626  BE
2 Wall Stop  409  US32D  RO
2 Astragal  18041CNB x Door Height  PE
2 Silencer  608  RO

Set: 15.0
Doors: 107g, 225

Description: Toilet, Lact.

3 Hinge  TA2714 4-1/2" x 4-1/2"  US26D  MK
1 Cylindrical Lock (privacy)  9K30L 15D S3  626  BE
1 Wall Stop  409  US32D  RO
3 Silencer  608  RO

Set: 16.0
Doors: 107j

Description: Skullery

Notes: All hardware furnished by Coiling Door Supplier.

Set: 17.0
Doors: 108, 108a, 108b, 110a, 110b

Description: Men, Women

3 Hinge  T4A3786 4-1/2" x 4-1/2"  US26D  MK
1 Push Plate  70C-RKW  US32D  RO
1 Pull Plate  BF 107x70C  US32D  RO
1 Surface Closer  PR7500  689  NO
<table>
<thead>
<tr>
<th>Set: 18.0</th>
<th>Doors: 110</th>
<th>Description: Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D MK</td>
</tr>
<tr>
<td>1 Push Plate</td>
<td>70C-RKW</td>
<td>US32D RO</td>
</tr>
<tr>
<td>1 Pull Plate</td>
<td>BF 107x70C</td>
<td>US32D RO</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>CLP7500</td>
<td>689 NO</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D RO</td>
</tr>
<tr>
<td>3 Silencer</td>
<td>608</td>
<td>RO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set: 19.0</th>
<th>Doors: 112a, 112b, 116, 116a, 117</th>
<th>Description: Locker</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D MK</td>
</tr>
<tr>
<td>1 Exit Device (classroom)</td>
<td>LC 8813 ETL</td>
<td>US32D SA</td>
</tr>
<tr>
<td>1 Cylinder</td>
<td>Housing to match existing</td>
<td>US26D BE</td>
</tr>
<tr>
<td>1 Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td>US26D BE</td>
</tr>
<tr>
<td>1 Construction Core</td>
<td>To fit Housing</td>
<td>US26D BE</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>PR7500</td>
<td>689 NO</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D RO</td>
</tr>
<tr>
<td>1 Wall Stop</td>
<td>409</td>
<td>US32D RO</td>
</tr>
<tr>
<td>3 Silencer</td>
<td>608</td>
<td>RO</td>
</tr>
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<table>
<thead>
<tr>
<th>Set: 20.0</th>
<th>Doors: 119b</th>
<th>Description: Storage (Rated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D MK</td>
</tr>
<tr>
<td>1 Cylindrical Lock (storeroom)</td>
<td>9K37D 15D S3</td>
<td>626 BE</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>CLP7500</td>
<td>689 NO</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D RO</td>
</tr>
<tr>
<td>1 Gasketing</td>
<td>S88D (Head &amp; Jambs)</td>
<td>PE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set: 21.0</th>
<th>Doors: 121, 121a</th>
<th>Description: Locker</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D MK</td>
</tr>
<tr>
<td>1 Cylindrical Lock (classroom)</td>
<td>9K37R 15D S3</td>
<td>626 BE</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>CLP7500</td>
<td>689 NO</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D RO</td>
</tr>
<tr>
<td>3 Silencer</td>
<td>608</td>
<td>RO</td>
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<table>
<thead>
<tr>
<th>Set: 22.0</th>
<th>Doors: 120</th>
<th></th>
</tr>
</thead>
</table>

DOOR HARDWARE 087100 - 24
Description: Vestibule (Dutch)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Set</th>
<th>Doors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinge</td>
<td>T4A3786 5&quot; x 4-1/2&quot;</td>
<td>23</td>
<td>120A</td>
</tr>
<tr>
<td>Surface Bolt</td>
<td>630-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylindrical Lock (passage)</td>
<td>9K30N 15D S3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnetic Lock</td>
<td>M62B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Stop</td>
<td>409</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door Stop &amp; Holder</td>
<td>494S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silencer</td>
<td>608</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position Switch</td>
<td>DPS-M-BK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push Button</td>
<td>PB2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Supply</td>
<td>BPS-24-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>HVD-62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Card reader furnished by Owner.
Operation: When door is closed and locked with top and bottom magnetic locks the wall reader on the outside wall will release the magnets and allow entry. During day time operations the top leaf will swing back against the wall at 180 degrees. The lower leaf will be closed and locked with the lower magnetic lock. If they want to exit out of the vestibule they will need to push the switch on the wall (PB2) to release the magnetic lock.

Set: 23.0
Doors: 120A
Description: Arms Vault

Notes: All hardware furnished by Vault Door Supplier.

Set: 24.0
Doors: 122c, 122d, 122e, 122f, 122g, 122h, 122i, 122j, 122k, 122l, 122m, 122n
Description: Wire Mesh Doors

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Set</th>
<th>Doors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder</td>
<td>Housing to match existing</td>
<td>24</td>
<td>125</td>
</tr>
<tr>
<td>Perm. Core</td>
<td>Match Owners Existing Keying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Core</td>
<td>To fit Housing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Set: 25.0
Doors: 125
Description: Demarc

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Set</th>
<th>Doors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hinge</td>
<td>TA2714 NRP 4-1/2&quot; x 4-1/2&quot;</td>
<td>25</td>
<td>200</td>
</tr>
<tr>
<td>Flush Bolt</td>
<td>555-12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust Proof Strike</td>
<td>570</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylindrical Lock (storeroom)</td>
<td>9K37D 15D S3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Stop</td>
<td>409</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silencer</td>
<td>608</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Metal overlapping astragal furnished by Hollow Metal Door Supplier.

Set: 26.0
Doors: 200
Description: Corridor
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

<table>
<thead>
<tr>
<th>Item</th>
<th>Model Number</th>
<th>Material</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Hinge</td>
<td>T4A3786 5&quot; x 4-1/2&quot;</td>
<td>US26D</td>
<td>MK</td>
</tr>
<tr>
<td>1 Magnetic Lock</td>
<td>M62</td>
<td>SU</td>
<td></td>
</tr>
<tr>
<td>2 Surface Vert Rod Exit</td>
<td>NB8710</td>
<td>US32D</td>
<td>SA</td>
</tr>
<tr>
<td>2 Surface Closer</td>
<td>PR7500</td>
<td>689</td>
<td>NO</td>
</tr>
<tr>
<td>2 Kick Plate</td>
<td>K1050 10&quot; x 1&quot; LDW CSK BEV</td>
<td>US32D</td>
<td>RO</td>
</tr>
<tr>
<td>2 Wall Stop</td>
<td>409</td>
<td>US32D</td>
<td>RO</td>
</tr>
<tr>
<td>2 Astragal</td>
<td>18041CNB x Door Height</td>
<td>PE</td>
<td></td>
</tr>
<tr>
<td>2 Silencer</td>
<td>608</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>2 Position Switch</td>
<td>DPS-W-BK</td>
<td>SU</td>
<td></td>
</tr>
<tr>
<td>1 Power Supply</td>
<td>BPS-24-1</td>
<td>SU</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Card reader furnished by Owner.
Operation: Door that swings from Lobby to corridor will be the door that receives the magnetic lock. Door is normally closed and locked. When a valid credential is presented to the wall mounted card reader the magnetic lock will release and you can push the push rail on the exit device and enter the corridor. When the door comes back closed the magnetic lock will relock.

**Set: 27.0**
Doors: 201
Description: Roof

<table>
<thead>
<tr>
<th>Item</th>
<th>Model Number</th>
<th>Material</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Continuous Hinge</td>
<td>CFMHD1 x Door Height</td>
<td>PE</td>
<td></td>
</tr>
<tr>
<td>1 Cylindrical Lock (institutional)</td>
<td>9K37W 15D S3</td>
<td>626</td>
<td>BE</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>UN7500 SN-134</td>
<td>689</td>
<td>NO</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D</td>
<td>RO</td>
</tr>
<tr>
<td>1 Threshold</td>
<td>279x292AFPKG x Opening Width</td>
<td>PE</td>
<td></td>
</tr>
<tr>
<td>1 Gasketing</td>
<td>S773D (Head &amp; Jambs)</td>
<td>PE</td>
<td></td>
</tr>
<tr>
<td>1 Rain Guard</td>
<td>346C x Overall Frame Width</td>
<td>PE</td>
<td></td>
</tr>
<tr>
<td>1 Sweep</td>
<td>345ANB x Door Width</td>
<td>PE</td>
<td></td>
</tr>
<tr>
<td>1 Position Switch</td>
<td>DPS-M-BK</td>
<td>SU</td>
<td></td>
</tr>
</tbody>
</table>

**Set: 28.0**
Doors: 202
Description: Open Office

<table>
<thead>
<tr>
<th>Item</th>
<th>Model Number</th>
<th>Material</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Continuous Hinge</td>
<td>CFMSLF-HD1 or CFMSLI-HD1</td>
<td>PE</td>
<td></td>
</tr>
<tr>
<td>1 Cylindrical Lock (storeroom)</td>
<td>9K37D 15D S3</td>
<td>626</td>
<td>BE</td>
</tr>
<tr>
<td>1 Electric Strike</td>
<td>1500C</td>
<td>630</td>
<td>HS</td>
</tr>
<tr>
<td>1 SMART Pac Bridge Rectifier</td>
<td>2005M3</td>
<td>HS</td>
<td></td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>PR7500</td>
<td>689</td>
<td>NO</td>
</tr>
<tr>
<td>1 Drop Plate</td>
<td>7788</td>
<td>689</td>
<td>NO</td>
</tr>
<tr>
<td>1 Wall Stop</td>
<td>409</td>
<td>US32D</td>
<td>RO</td>
</tr>
<tr>
<td>1 Position Switch</td>
<td>DPS-W-BK</td>
<td>SU</td>
<td></td>
</tr>
<tr>
<td>1 Motion Sensor</td>
<td>XMS</td>
<td>SU</td>
<td></td>
</tr>
<tr>
<td>1 Power Supply</td>
<td>BPS-24-1</td>
<td>SU</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Card reader furnished by Owner.
Operation: Door is normally closed and locked. When a valid credential is presented to the wall mounted card reader the electric strike will release and you can pull the door open. When the door comes back closed the
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO  
Project Number T1809-01

electric strike will relock. The XMS will be mounted inside the open office and used by the access control system as the REX or request to exit switch.

### Set: 29.0
Doors: 203  
Description: Open Office

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Color</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Continuous Hinge</td>
<td>CFMSLF-HD1 or CFMSLI-HD1</td>
<td>PE</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Cylindrical Lock (classroom)</td>
<td>9K37R 15D S3</td>
<td>626</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Surface Closer</td>
<td>UNI7500</td>
<td>689</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Drop Plate</td>
<td>7788</td>
<td>689</td>
<td>1</td>
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</tbody>
</table>

### Set: 30.0
Doors: 203a, 229  
Description: Storage

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Color</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Hinge</td>
<td>TA2714 NRP 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Flush Bolt</td>
<td>555-12</td>
<td>US26D</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Dust Proof Strike</td>
<td>570</td>
<td>US26D</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>Cylindrical Lock (storeroom)</td>
<td>9K37D 15D S3</td>
<td>626</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Surf Overhead Stop</td>
<td>9 Series</td>
<td>652</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Astragal</td>
<td>18041CNB x Door Height</td>
<td>PE</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Silencer</td>
<td>608</td>
<td>RO</td>
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### Set: 31.0
Doors: 222  
Description: Stairs (Rated)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Color</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Exit Device (passage)</td>
<td>12 8815 ETL</td>
<td>US32D</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Surface Closer</td>
<td>7500</td>
<td>689</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Wall Stop</td>
<td>409</td>
<td>US32D</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Gasketing</td>
<td>S88D (Head &amp; Jambs)</td>
<td>PE</td>
<td>1</td>
</tr>
</tbody>
</table>

### Set: 32.0
Doors: 224, 224a  
Description: Med Section

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Color</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
<td>TA2714 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Cylindrical Lock (classroom)</td>
<td>9K37R 15D S3</td>
<td>626</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Surface Closer</td>
<td>CLP7500</td>
<td>689</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td>US32D</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Silencer</td>
<td>608</td>
<td>RO</td>
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### Set: 33.0
Doors: 227, 228  
Description: Men, Women

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Model</th>
<th>Color</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Hinge</td>
<td>T4A3786 4-1/2&quot; x 4-1/2&quot;</td>
<td>US26D</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>Push Plate</td>
<td>70C-RKW</td>
<td>US32D</td>
<td>1</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Quantity</td>
<td>Code</td>
<td>Finish</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------------------</td>
<td>----------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>1 Pull Plate</td>
<td>BF 107x70C</td>
<td></td>
<td>US32D</td>
<td>RO</td>
</tr>
<tr>
<td>1 Surface Closer</td>
<td>7500</td>
<td></td>
<td>689</td>
<td>NO</td>
</tr>
<tr>
<td>1 Kick Plate</td>
<td>K1050 10&quot; x 2&quot; LDW CSK</td>
<td></td>
<td>US32D</td>
<td>RO</td>
</tr>
<tr>
<td>1 Wall Stop</td>
<td>409</td>
<td></td>
<td>US32D</td>
<td>RO</td>
</tr>
<tr>
<td>3 Silencer</td>
<td>608</td>
<td></td>
<td></td>
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</tr>
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</table>

**Set: 34.0**
Doors: 229a
Description: Storage

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Code</th>
<th>Finish</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Hinge</td>
<td>TA2714 NRP 4-1/2&quot; x 4-1/2&quot;</td>
<td></td>
<td>US26D</td>
<td>MK</td>
<td></td>
</tr>
<tr>
<td>2 Flush Bolt</td>
<td>555-12</td>
<td></td>
<td>US26D</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>1 Dust Proof Strike</td>
<td>570</td>
<td></td>
<td>US26D</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>1 Cylindrical Lock (storeroom)</td>
<td>9K37D 15D S3</td>
<td></td>
<td>626</td>
<td>BE</td>
<td></td>
</tr>
<tr>
<td>2 Wall Stop</td>
<td>409</td>
<td></td>
<td>US32D</td>
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Doors: 231
Description: Storage

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END OF SECTION 087100
SECTION 088000 - GLAZING

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. Glass for windows, doors, interior borrowed lites, storefront framing and glazed curtain walls.
   2. Glazing sealants and accessories.

B. Related Requirements:
   1. Division 8 Section "Aluminum Framed Entrances and Storefront."
   2. Division 8 Section "Hollow Metal Doors and Frames."
   3. Division 8 Section "Wood Doors."
   4. Section 088300 "Mirrors."
   5. Section 088813 "Fire-Resistant Glazing."

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.


D. Interspace: Space between lites of an insulating-glass unit.

1.4 DOD MINIMUM ANTITERROISM STANDARDS

A. Glazing shall comply with Unified Criteria Document UFC 4-010-01 Standard 10.

B. The basic design criteria are listed in Section 018388 "Blast Resistance."

1.5 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
1.6  PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review temporary protection requirements for glazing during and after installation.

1.7  ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Glass Samples: For each type of glass product other than clear monolithic vision glass the following products; 12 inches square.
   1. Tinted glass.
   2. Coated glass.
   3. Laminated glass.
   4. Insulating glass.
C. Glazing Accessory Samples: For [sealants] [and] [colored spacers], in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
E. 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.

1.8  INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer manufacturers of insulating-glass units with sputter-coated, low-E coatings.
B. Product Certificates: For glass.
C. Product Test Reports: For [tinted glass] [coated glass] [insulating glass] [and] [glazing sealants], for tests performed by a qualified testing agency.
   1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
D. Preconstruction adhesion and compatibility test report.
E. Sample Warranties: For special warranties.
1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
   1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" Section 084413 "Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods.
   2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. 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.

1.11 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.

1.12 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: 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 for Laminated Glass:** Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

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

C. **Manufacturer's Special Warranty for 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 MANUFACTURERS**

A. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated in glass schedules or comparable product by one of the following:

2. Guardian Industries Corp.; SunGuard.
3. Oldcastle BuildingEnvelope®.
5. PPG Industries, Inc.
7. Viracon, Inc.

B. **Source Limitations for Glass:** Obtain from single source from single manufacturer for each glass type.

1. Obtain tinted glass from single source from single manufacturer.
2. Obtain reflective-coated glass from single source from single manufacturer.

C. **Source Limitations for Glazing Accessories:** Obtain from single source from single manufacturer for each product and installation method.

**2.2 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 014000 "Quality Requirements," to design glazing.
C. Structural Performance: 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. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
5. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with enhanced-protection testing requirements in ASTM E 1996 for Wind Zone 1 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.

1. Large-Missile Test: For glazing located within 30 feet of grade.
2. Small-Missile Test: For glazing located more than 30 feet above grade.

E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

F. 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 of thickness indicated.
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.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

B. Safety Glazing Labeling: Where safety glazing 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.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
   1. Minimum Glass Thickness for Exterior Lites: 6 mm.
   2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

C. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

E. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172. 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 instructions.
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seal, with manufacturer’s standard primary and secondary sealants.
2. Perimeter Spacer: Manufacturer’s standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they 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. Sealant 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."
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. Manufacturers: Subject to compliance with requirements, provide one of the following:
   a. Dow Corning Corporation.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   d. Pecora Corporation.
   e. Sika Corporation.
   f. Tremco Incorporated.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
   1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
   2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 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.
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.
   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 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. 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 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. 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.

C. Remove and replace glass that is damaged during construction period.

D. 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.

3.8 MONOLITHIC GLASS SCHEDULE

A. Glass Type GL-1: Clear float glass fully tempered.

1. Minimum Thickness: 1/4 inch (6 mm).
2. Provided Safety glazing labeling.

B. Glass Type GL-2: Tinted float glass - fully tempered with reflective coating on one side

1. Thickness: 1/4 inch
2. Provide safety glazing labeling
3.9 INSULATED GLASS SCHEDULE

B. Glass Type GL-3: Low-e-coated, tinted insulating glass (Overall Unit Thickness: 1 inches).
1. Thickness of Outdoor Lite: 1/4 inch.
2. Outdoor Lite: Tinted float fully tempered glass.
3. Interspace Content: ½ inch air.
4. Indoor Lite: Clear 1/4 inch heat strengthened float glass.
5. Low-E Coating: Second surface. PPG Optiblue or equal.

B. Glass Type GL-4: Low-e-coated, tinted insulating laminated spandrel glass.
1. Overall Unit Thickness: 1 inches.
2. Thickness of Outdoor Lite: 1/4 inch.
3. Outdoor Lite: Tinted float glass annealed.
4. Interspace Content: ½ inch air.
5. Indoor Lite: 1/4 inch opaque spandrel heat strengthened float glass (Neutral colored opacifier on the third surface).
6. Low-E Coating: Second surface. PPG Optiblue or equal.

C. Glass Type GL-5: Low-e-coated, tinted insulating glass, safety application
1. Overall Unit Thickness: 1 inches
2. Thickness of Outdoor Lite: 1/4 inch.
3. Outdoor Lite: Tinted float glass fully tempered.
4. Interspace Content: ½ inch air.
5. Indoor Lite: Clear 1/4 inch heat strengthened float glass.
6. Low-E Coating: Second surface. PPG Optiblue or equal.
7. Provide safety glazing labeling.
SECTION 089119 - FIXED LOUVERS

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 extruded-aluminum louvers.

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 axis of the blades are horizontal).

C. Vertical Louver: Louver with vertical blades (i.e., the axis of the blades are vertical).

D. 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.

E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven-rain performance, as determined by testing according to AMCA 500-L.

F. Windborne-Debris-Impact-Resistant Louver: Louver that provides specified windborne-debris-impact resistance, as determined by testing according to AMCA 540.

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. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Certificates: For materials manufactured within 100 miles (m) of processing location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each raw material.

3. Environmental Product Declaration: For each product.

4. Health Product Declaration: For each product.

5. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. 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, flashings, sealants, and other means of preventing water intrusion.
2. Show mullion profiles and locations.

D. Samples: For each type of metal finish required.

E. Delegated-Design Submittal: For louvers indicated to comply with structural and seismic performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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. Windborne-debris-impact-resistance test reports.

C. Sample Warranties: For manufacturer’s special warranties.

1.6 QUALITY ASSURANCE

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

1. AWS D1.2/D1.2M.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 WARRANTY

A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fixed [and operable] louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural [and seismic] performance requirements and design criteria indicated.

B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

C. Windborne-Debris-Impact Resistance: Louvers located within 30 feet of grade shall pass [basic] [enhanced] protection, when tested according to AMCA 540.

D. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

E. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.


2.3 FIXED EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Drainable-Blade Louver <Insert drawing designation>:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Ruskin ELF375DXD drainable blade hurricane louver or comparable product by one of the following:

a. Air Balance Inc.; a division of MESTEK, Inc.
b. Greenheck Fan Corporation.
c. Pottorff.

2. Louver Depth: 4 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Mullion Type: Exposed.
5. Louver Performance Ratings:
   b. Point of Beginning Water Penetration: Not less than 1000 fpm.
   c. Air Performance: Not more than 0.10-inch wg static pressure drop at 800-fpm free-area [exhaust] [intake] velocity.
   d. Air Performance: Not more than 0.15-inch wg static pressure drop at [900-fpm] [950-fpm] [1000-fpm] <Insert value> free-area [exhaust] [intake] velocity.

6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

A. General: Provide screen at [each exterior louver] [louvers indicated].
   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] [machine screws with heads finished to match louver], 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. Reinforce extruded-aluminum screen frames at corners with clips.
   2. Finish: [Same finish as louver frames to which louver screens are attached] [Mill finish unless otherwise indicated].
   3. Type: Rewirable frames with a driven spline or insert.

D. Louver Screening for Aluminum Louvers:
   1. Bird Screening: Aluminum, 1/2-inch- square mesh, 0.063-inch wire.

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.

D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, [No. 2B finish] [No. 2D finish] [No. 4 finish, with grain running parallel to length of blades and frame members] [No. 4 finish, with grain running perpendicular to length of blades and frame members] [No. 4 finish, with grain running perpendicular to length of blades and parallel to length of frame members] [No. 6 finish].

E. Fasteners: Use types and sizes to suit unit installation conditions.
   1. Use [Phillips flat-head] [hex-head or Phillips pan-head] [tamper-resistant] 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.

F. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E 488/E 488M conducted by a qualified testing agency.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

H. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [25] [Insert value] percent.

I. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [25] [50] [Insert value] percent.

J. Regional Materials: Products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

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. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
   1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern [unless horizontal mullions are indicated] [where indicated].
   2. Horizontal Mullions: Provide horizontal mullions at joints [unless continuous vertical assemblies are indicated] [where indicated].

C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

D. 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] [Exterior flange] [Interior flange] unless otherwise indicated.
E. Include supports, anchorages, and accessories required for complete assembly.

F. 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. Exterior Corners: Prefabricated corner units with mitered [and welded blades] [blades with concealed close-fitting splices] and with [fully recessed] [semirecessed] mullions at corners.

G. Provide [subsills made of same material as louvers] [or] [extended sills] for recessed louvers.

H. Join frame members to each other and to fixed louver blades with fillet welds [concealed from view] [, 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. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] [AA-M12C22A31, Class II, 0.010 mm] or thicker.

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
SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For embossed steel studs and tracks firestop tracks, 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 Certified Steel Stud Association the Steel Framing Industry Association or the Steel Stud Manufacturers 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. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft..

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.

B. Studs and Tracks: ASTM C 645. Use either steel studs and tracks or embossed steel studs and tracks.

1. Steel Studs and Tracks:
   a. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection 0.0269 inch.
   b. Depth: As indicated on Drawings.

2. Embossed Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally equivalent to conventional ASTM C 645 steel studs and tracks.
   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
      1) ClarkDietrich Building Systems.
      2) MarinoWARE.
   b. Minimum Base-Metal Thickness: As required by horizontal deflection performance requirements.
   c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:
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. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
      1) ClarkDietrich Building Systems; SLP-TRK Slotted Deflection Track.

D. 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. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
      a. ClarkDietrich Building Systems; BlazeFrame.
      b. Fire Trak Corp; Fire Trak System attached to studs with Fire Trak Posi Klip.
      c. Steel Network, Inc. (The).

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
   1. Minimum Base-Metal Thickness: 0.0269 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.
   1. Depth: As required to meet deflection criteria.
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

   1. Minimum Base-Metal Thickness: 0.0329 inch.
   2. Depth: As indicated on Drawings.

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
   1. Configuration: Asymmetrical or hat shaped.

I. 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.

J. Z-Shaped Furring: 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.

2.3 SUSPENSION SYSTEMS

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. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 as appropriate for the substrate.
      a. Uses: Securing hangers to structure.

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: As required to meet deflection and performance criteria.

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. Embossed Steel Studs and Tracks: ASTM C 645.
      a. Minimum Base-Metal Thickness: As indicated on Drawings 0.0190 inch.
      b. Depth: As indicated on Drawings.
      a. Minimum Base-Metal Thickness: 0.0329 inch.
5. 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. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
   b. Chicago Metallic Corporation; 640/660 Drywall Ceiling Suspension.
   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. Isolation Strip at Exterior Walls: Provide one of the following:

2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

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.
B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.

2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

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 to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, 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 spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.

2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated.

3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks 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. Direct Furring:
   1. Screw to wood framing.
   2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:
   1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 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.

G. 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 spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
   1. Hangers: 48 inches o.c.
   2. Carrying Channels (Main Runners): 48 inches o.c.
   3. Furring Channels (Furring Members): 16 inches o.c.
B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
      a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
      a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
   3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
   4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
   5. Do not attach hangers to steel roof deck.
   6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
   7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
   8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216
SECTION 092900 - GYPSUM BOARD

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. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.

B. Related Requirements:

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
3. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
3. Product Data: For adhesives and sealants, indicating VOC content.
4. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For ceiling and wall materials, indicating compliance with requirements for low-emitting materials.

C. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

D. Samples for Verification: For the following products:
1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:
   a. Each level of gypsum board finish indicated for use in exposed locations.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.

3. Simulate finished lighting conditions for review of mockups.

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

1.5 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.

1.6 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.

C. Ceiling and wall materials shall comply with the 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."

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
      a. American Gypsum.
      b. CertainTeed Corporation.
      c. Georgia-Pacific Building Products.
      e. Temple-Inland Building Products by Georgia-Pacific.
      f. USG.
   2. Thickness: As indicated on Drawings.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
      a. American Gypsum.
      b. CertainTeed Corporation.
      c. Georgia-Pacific Building Products.
      e. Temple-Inland Building Products by Georgia-Pacific.
      f. USG.
   2. Thickness: 5/8 inch.

C. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
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 available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
   a. American Gypsum.
   b. CertainTeed Corporation.
   c. Georgia-Pacific Building Products.
   e. Temple-Inland Building Products by Georgia-Pacific.
   f. USG.

2. Thickness: 1/2 inch.

D. Impact-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
   a. American Gypsum.
   b. CertainTeed Corporation.
   c. Georgia-Pacific Building Products.
   e. Temple-Inland Building Products by Georgia-Pacific.
   f. USG.

2. Core: 5/8 inch, Type X.
3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
4. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
8. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

E. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
   a. American Gypsum.
   b. CertainTeed Corporation.
   c. Georgia-Pacific Building Products.
   e. Temple-Inland Building Products by Georgia-Pacific.
   f. USG.
2. Core: As indicated 1/2 inch, regular type 5/8 inch, Type X.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer’s standard edges.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
   a. CertainTeed Corporation.
   b. Georgia-Pacific Building Products.
   c. National Gypsum Company.
   d. Temple-Inland Building Products by Georgia-Pacific.
   e. United States Gypsum Company.

2. Core: As indicated 5/8 inch, Type X.

2.5 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer’s standard edges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide [product indicated on Drawings] [Insert manufacturer’s name; product name or designation] or comparable product by one of the following:
   a. CertainTeed Corporation.
   b. James Hardie Building Products, Inc.
   c. National Gypsum Company.
   d. United States Gypsum Company.

2. Thickness: As indicated.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:
   a. Cornerbead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.


1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
2. Shapes:
   a. Corner bead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer’s written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
1. Adhesives shall have a VOC content of 50 g/L or less.
2. Adhesive 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. 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.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: 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.
2. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert value> percent.

E. Acoustical Sealant: Manufacturer’s standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect
   a. Accumetric LLC.
   b. Grabber Construction Products.
   c. Hilti, Inc.
   d. Pecora Corporation.
   e. Specified Technologies, Inc.
   f. United States Gypsum Company.
2. Sealant 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."

F. Thermal Insulation: As specified in Division 07 Section "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. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. 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.

G. 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.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. 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.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
1. Wallboard Type: As indicated on Drawings.
2. Type X: Where required for fire-resistance-rated assembly.
3. Ceiling Type: As indicated on Drawings.
4. Impact-Resistant Type: As indicated on Drawings.
5. Mold-Resistant Type: As indicated on Drawings.
6. Acoustically Enhanced Type: As indicated on Drawings.

B. 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.

C. 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.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer’s written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.
3.5 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 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 unless otherwise indicated.
   2. LC-Bead: Use at exposed panel edges.
   3. L-Bead: Use where indicated.
   4. U-Bead: Use at exposed panel edges.

D. Exterior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners.
   2. LC-Bead: Use at exposed panel edges.

E. Aluminum Trim: Install in locations indicated on Drawings.

3.7 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 2: Panels that are substrate for tile.
   3. Level 3: Where indicated on Drawings.
   4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
      a. Primer and its application to surfaces are specified in other Division 09 Sections.
   5. Level 5: Where indicated on Drawings.
a. Primer and its application to surfaces are specified in other Division 09 Sections.

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 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 acoustical panels and exposed suspension systems for interior ceilings.

B. Related Requirements:

1. See Division 22 for grilles, registers, and diffusers in acoustical ceilings.
2. See Division 26 for lighting fixtures in acoustical ceilings.

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.

C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.
   a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical panels.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:
   a. Lighting fixtures.
   b. Diffusers.
   c. Grilles.
   d. Speakers.
   e. Sprinklers.
   f. Access panels.
   g. Perimeter moldings.

7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.

B. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

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. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
3. Hold-Down Clips: Equal to 2 percent of quantity installed.
4. Impact Clips: Equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

A. 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 mockup of typical ceiling area as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 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.

1.10 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.

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

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. Ceiling products shall comply with the 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. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.

C. 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 C according to ASTM E 1264.
2. Smoke-Developed Index: 50 or less.
D. 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. 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 available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries Ultima Tegular, white or comparable product by one of the following:

1. CertainTeed Corporation.
2. United States Gypsum Company.

C. 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.

D. Color: White.

E. Edge/Joint Detail: As indicated by manufacturer's designation.

F. Thickness: 5/8 inch.

G. Modular Size: 24 by 24 inches.

H. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEM

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 available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Prelude XL 15/16 Exposed Tee or comparable product by one of the following:

1. CertainTeed Corporation.
2. Chicago Metallic Corporation.
C. Metal Suspension-System Standard: Provide manufacturer’s standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for “severe environment performance” according to ASTM C 635/C 635M.

D. Wide-Face, Capped, Double-Web, Fire-Rated, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Cold-rolled steel or aluminum.

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. 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] <Insert safety factor> 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:

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. Hold-Down Clips: Manufacturer’s standard hold-down.

G. Impact Clips: Manufacturer’s standard impact-clip system designed to absorb impact forces against acoustical panels.
2.6  METAL EDGE MOLDINGS AND TRIM

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 available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

B. 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. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7  ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Division 07 Section "Acoustical Joint Sealants."

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/C 636M, seismic design requirements, and manufacturer’s written instructions.
1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

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 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. As indicated on reflected ceiling plans.

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.

6. Install hold-down impact and seismic clips in areas indicated; space according to panel manufacturer’s written instructions unless otherwise indicated.
   a. Hold-Down Clips: Space 24 inches o.c. on all cross runners.

7. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

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 FIELD QUALITY CONTROL

A. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.

   1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
   2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
C. Prepare test and inspection reports.

3.6 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
SECTION 096513 - RESILIENT BASE AND ACCESSORIES

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 stair accessories.
   3. Resilient molding accessories.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. LEED Submittals:
   1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
   2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
   3. Product Data for Credit IEQ 4.3: For resilient accessories, documentation from an independent testing agency indicating compliance with the FloorScore standard.
C. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS
A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.
1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

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] \(<\text{Insert temperature}\>\), 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 PERFORMANCE REQUIREMENTS

A. Low-Emitting Materials: Flooring system 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."

2.2 THERMOSET-RUBBER BASE RB-1

A. Basis-of-Design Product: Subject to compliance with requirements, provide Johnsonite/Tarkett or comparable product by one of the following:

1. Burke Mercer Flooring Products, Division of Burke Industries Inc.
2. Flexco.
3. Roppe Corporation, USA.

B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
1. Style and Location:

C. Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Preformed.

H. Colors: As indicated on Drawings.

2.3 RUBBER STAIR ACCESSORIES

A. Fire-Test-Response Characteristics: 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.

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following

   1. Armstrong World Industries, Inc.
   2. Burke Mercer Flooring Products, Division of Burke Industries Inc.
   3. Flexco.
   4. Johnsonite; A Tarkett Company.
   5. Musson Rubber Company.
   6. Roppe Corporation, USA.

C. Stair Treads: ASTM F 2169.

   1. Type: TS (rubber, vulcanized thermoset).
   2. Class: 2 (pattern; embossed, grooved, or ribbed).
   4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
   6. Thickness: 1/4 inch and tapered to back edge.
   7. Size: Lengths and depths to fit each stair tread in one piece or, for treads exceeding maximum lengths manufactured, in equal-length units.

D. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

   1. Style: Toeless, by length matching treads.
   2. Thickness: Manufacturer's standard.
E. Stringers: Height and length after cutting to fit risers and treads and to cover stair stringers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

1. Thickness: Manufacturer's standard.

F. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

G. Locations: Provide rubber stair accessories in areas indicated.

H. Colors and Patterns: As indicated on the Drawings.

2.4 RUBBER MOLDING ACCESSORY

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. Roppe Corporation, USA.
2. VPI, LLC, Floor Products Division.

B. Description: Rubber carpet edge for glue-down applications reducer strip for resilient flooring joiner for tile and carpet transition strips.

C. Profile and Dimensions: As indicated.

D. Locations: Provide rubber molding accessories in areas indicated and required by the design.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.5 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.

1. 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. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.
E. **Floor Polish:** Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

**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. **Concrete Substrates for Resilient Stair Accessories:** Prepare horizontal surfaces 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 manufacturer. Do not use solvents.
3. **Alkalinity and Adhesion Testing:** Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
4. **Moisture Testing:** Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:

   a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
   b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.

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 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.

E. 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 masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer’s recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

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 Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.

2. Tightly adhere to substrates throughout length of each piece.

3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
C. 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. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
   1. Apply three coat(s).

E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513
SECTION 096519 - RESILIENT TILE FLOORING

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 vinyl floor tile.
2. Vinyl enhanced floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Product Data: For sealants, indicating VOC content.
3. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
4. Environmental Product Declaration: For each product.
5. Health Product Declaration: For each product.

C. Shop Drawings: For each type of resilient floor tile.

1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

D. Samples: Full-size units of each color, texture, and pattern of floor tile required.

E. Samples for Verification: Full-size units of each color and pattern of floor tile required.

F. 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.

1.6 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. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

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.
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.

B. Flooring products shall comply with the 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."

2.2 VINYL ENHANCED FLOOR TILE VET-1

A. Basis-of-Design Product: Subject to compliance with requirements, provide Azrock Collection, Azterra Series or comparable product by one of the following

1. Armstrong World Industries, Inc; 
2. Johnsonite; A Tarkett Company; 
3. Mannington Mills, Inc; 

B. Tile Standard: ASTM F 1066, Class 2, through pattern.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch.

E. Size: 12 by 12 inches.

F. Colors and Patterns: Cassell AT111 .

2.3 HIGH PERFORMANCE FLOOR TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Raskin Gorilla Flooring; Series: Studio Elevations Tile; Style: Chelsea; Color: Elev-102 or comparable product by one of the following:

1. Milliken Commercial
2. Armstrong Commercial Flooring
3. Raskin Floors

B. Tile Standard: ASTM E648, Class 1

C. Wear Surface: Embossed Textured

D. Thickness: 0.197 inch.

E. Size: 12 inch x 24" inches
F. Wear Layer: 20 mil

G. Warranty: 12 Year Limited Commercial Warranty

2.4 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.

1. Use adhesives as recommended by flooring manufacturer for substrates and as required to maintain tile manufacturer’s warranty.
2. Adhesives shall be of type for installation on concrete with alkali and moisture resistance up to relative humidity of 90%.
3. Adhesives shall have a VOC content of 50 g/L or less.
4. Adhesive 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. Floor Polish: Provide Owner with list of protective liquid floor polish products as recommended by manufacturer for specific tile products. Coordinate with Owner to schedule Owner's application of floor polish.

D. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

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, but not less than 5 or more than 10 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
   a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
   b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
5. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
6. 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.
7. 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.
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.
   1. Lay tiles with grain running in one direction.
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.

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. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish. Coordinate with Owner for Owner’s forces to apply liquid floor polish to VCT flooring.
   1. Apply three coat(s).

E. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.

F. Cover floor tile until Substantial Completion.

END OF SECTION 096519
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 resinous flooring systems.

1.3 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS
A. Product Data: For each type of product. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
B. LEED Submittals:
   1. Product Data for Credit IEQ 4.2: For liquid-applied flooring components, documentation including printed statement of VOC content.
C. Samples: For each type of exposed finish required.

1.5 INFORMATIONAL SUBMITTALS
A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
B. Material certificates.
C. Material test reports.

1.6 CLOSEOUT SUBMITTALS
A. Maintenance data. For resinous flooring to include in maintenance manuals.
1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
   1.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Apply full-thickness mockups on 96-inch- (2400-mm-) square floor area selected by Architect.
      a. Include 96-inch (2400-mm) length of integral cove base with inside and outside corner.
   2. Simulate finished lighting conditions for Architect's review of mockups.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for 24 hours after application unless manufacturer recommends a longer period.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. VOC Content of Liquid-Applied Flooring Components: Not more than 100 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Flammability: Self-extinguishing according to ASTM D 635.

2.2 RESINOUS FLOORING RES-1 and RES-2

A. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, and resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Duraflex, Inc.; Hybri-Flex EC or comparable product by one of the following:
   a. Arizona Polymer Flooring, Inc.
   b. BASF Construction Chemicals, Inc.; BASF Building Systems.
   c. CornerStone Flooring & Linings.
   d. DUDICK Inc.
   e. Dur-A-Flex, Inc.
   g. International Coatings Inc.
   h. NEOGARD; a division of JONES-BLAIR.
   i. Sika Corporation U.S.
   j. Stonhard, Inc.
   k. Tamms Industries, Inc.; a division of the Euclid Chemical Company.
   l. Tnemec Company, Inc.

B. System Characteristics:

1. Color and Pattern: RES-1 - Cobblestone; RES-2 - Cobalt.
2. Wearing Surface: (1) Duraglaze, #4 Topcoat Armor Top Gloss w/ Grit Textured for slip resistance.
3. Overall System Thickness: 3/16 inch.

C. Primer: Type recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated.

D. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

1. Compressive Strength: 16,000 psi minimum according to ASTM C 579.
2. Tensile Strength: 3700 psi minimum according to ASTM C 307.
3. Flexural Modulus of Elasticity: 4700 psi minimum according to ASTM C 580.
4. Water Absorption: 0.04 percent maximum according to ASTM C 413.
F. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested according to ASTM D 1308 for 50 percent immersion in the following reagents for no fewer than seven days:

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

   1. Roughen concrete substrates as follows:
      a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
      b. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.

   2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.

   3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
      a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab area in 24 hours.
      b. Plastic Sheet Test: ASTM D 4263. Proceed with application only after testing indicates absence of moisture in substrates.
      c. Relative Humidity Test: Use in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

   4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

D. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.
3.2 APPLICATION

A. Apply components of resinous flooring system according to manufacturer’s written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer’s written instructions. Prevent contamination during application and curing processes.
3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer’s written instructions.

B. Primer: Apply primer over prepared substrate at manufacturer’s recommended spreading rate.

C. Reinforcing Membrane: Apply reinforcing membrane to substrate cracks.

D. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer’s written instructions. Round internal and external corners.

1. Integral Cove Base: 4 inches high.

E. Self-Leveling Body Coats: Apply self-leveling slurry body coats in thickness indicated for flooring system.

1. Aggregates: Broadcast aggregates at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.

F. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended by manufacturer.

G. Grout Coat: Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in surface of final body coat.

H. Topcoats: Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer and to produce wearing surface indicated.

I. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 096723
SECTION 096813 - TILE CARPETING

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 modular carpet tile.
B. Related Requirements:
   1. Section 096513 "Resilient Base and Accessories" Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
      a. Review delivery, storage, and handling procedures.
      b. Review ambient conditions and ventilation procedures.
      c. Review subfloor preparation procedures.
      d. Review subfloor moisture testing and PH testing procedures.

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. Sustainable Design Submittals:
   1. Product Data: For adhesives, indicating VOC content.
   2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
   3. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
C. Shop Drawings: For carpet tile installation, plans showing the following:
1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.

E. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.

F. Product Schedule: For carpet tile. Use same designations indicated on Drawings.


1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

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

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, 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 tile.
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 Tile: Full-size units equal to 2 percent of amount installed for each type indicated.

QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes 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.

DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI's "CRI Carpet Installation Standard."

FIELD CONDITIONS

A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles 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 tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile 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 edge raveling, snags, and runs.
b. Dimensional instability.
c. Excess static discharge.
d. Loss of tuft-bind strength.
e. Loss of face fiber.
f. Delamination.

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

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Atlas Carpet Mills, Inc.
3. Mannington Mills, Inc.
5. Mohawk Group (The); Mohawk Carpet, LLC.
6. Patcraft; a division of Shaw Industries, Inc.
7. Shaw Contract Group; a Berkshire Hathaway company.
8. Tandus; a Tarkett company.

B. Color: As indicated on Finish Legend.

C. Pattern: Insert pattern as indicated on Finish Legend.

D. Primary Backing/Backcoating: Manufacturer's standard composite materials.

E. Secondary Backing: Manufacturer's standard material.

F. Size: 24 by 24 inches.

G. Applied Treatments:

2. Antimicrobial Treatment: Manufacturer’s standard treatment that protects carpet tiles as follows:
   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.

H. Sustainable Design Requirements:

1. Sustainable Product Certification: [Silver] [Gold] [Platinum] level certification according to ANSI/NSF 140.
2. Flooring products shall comply with the 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."

I. Performance Characteristics:

1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D 7330.
2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
3. Dry Breaking Strength: Not less than 100 lbf according to ASTM D 2646.
4. Tuft Bind: Not less than 10 lbf according to ASTM D 1335.
5. Delamination: Not less than 3.5 lbf/in. according to ASTM D 3936.
6. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
8. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
9. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC 16, Option E.
10. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

1. Adhesive 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. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

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 tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
1. **Moisture Testing:** Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
   
   a. **Anhydrous Calcium Chloride Test:** ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
   
   b. **Relative Humidity Test:** Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
   
   c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass test.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. **General:** Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

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 adhesive and carpet tile manufacturers.

D. **Broom and vacuum clean substrates to be covered immediately before installing carpet tile.**

### 3.3 INSTALLATION

A. **General:** Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer’s written installation instructions.

B. **Installation Method:** As recommended in writing by carpet tile manufacturer.

C. **Maintain dye-lot integrity.** Do not mix dye lots in same area.

D. **Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.**

E. **Cut and fit carpet tile 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 tile manufacturer.

F. **Extend carpet tile into toe spaces,** door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. **Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor.** Use nonpermanent, nonstaining marking device.
3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.

B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.
SECTION 098436 - SOUND-ABSORBING CEILING UNITS

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, acoustical panel units tested for acoustical performance, including the following:

1. Sound-absorbing baffle panels.

1.3 DEFINITIONS

A. NRC: Noise Reduction Coefficient.

B. SAA: Sound Absorption Average.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include fabric facing, panel edge, core material, and mounting indicated.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

2. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For unit assembly and installation.

1. Include reflected ceiling plans, elevations, sections, and mounting devices and details.

2. Include details at joints and corners; and details at ceiling intersections and intersections with walls. Indicate panel edge profile and core materials.

3. Include direction of fabric weave and pattern matching.
D. Samples for Initial Selection: For each type of fabric facing.
   1. Include Samples of hardware and accessories involving color or finish selection.

E. Samples for Verification: For the following products:
   1. Fabric: Full-width by approximately 36-inch-long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
   2. Panel Edge: 12-inch-long Sample(s) showing each edge profile, corner, and finish.
   3. Core Material: 12-inch-square Sample at corner.
   5. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans 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.
   2. Suspended ceiling components above ceiling units.
   3. Structural members to which suspension devices will be attached.
   4. Items penetrating or covered by units including the following:
      a. Lighting fixtures.
      b. Air outlets and inlets.
      c. Speakers.
      d. Alarms.
      e. Sprinklers.
      f. Access panels.
   5. Show operation of hinged and sliding components covered by or adjacent to units.

B. Product Certificates: For each type of unit.

C. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturer’s written cleaning and stain-removal instructions.

1.8 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. Fabric: For each fabric, color, and pattern installed, furnish length equal to 2 percent of amount installed. Full width of bolt.
2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices.

1.9 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
   1. Build mockup of typical ceiling area 96 inches wide by full width of ceiling. Include intersection of wall and ceiling, corners, and perimeters.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Comply with fabric and unit 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.

1.11 FIELD CONDITIONS

A. Environmental Limitations: Do not install units 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. Lighting: Do not install units until a lighting level of not less than 50 fc is provided on surfaces to receive the units.

C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.

D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      b. Fabric sagging, distorting, or releasing from panel edge.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain ceiling units specified in this Section from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Ceiling products shall comply with the 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. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.3 SOUND-ABSORBING CEILING UNITS

A. Sound-Absorbing Baffle Panel (APC-2 and APC-3): Manufacturer's standard panel construction consisting of facing material stretched over front and back faces and edge-framed core and bonded or attached to edges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Turf Design; Product, "SLICE" ceiling system, or a comparable product by one of the following:
   a. Armstrong World Industries.
   b. AVL Systems, Inc.
   c. Benton Brothers Solutions, Inc.
   d. Brejtfs Acoustical Interiors.
   e. Conwed Designscapes; an Owens Corning company.
   f. Decoustics Limited; a Saint Gobain company.
   g. Essi Acoustical Products.
   h. Golterman & Sabo.
   i. Lamvin, Inc.
j. MBI Products Company, Inc.
k. Panel Solutions, Inc.
l. Perdue Acoustics, Inc.
m. Pinta Acoustics, Inc.
n. Proudfoot Company, Inc. (The).
o. Sound Concepts Canada, Inc.
p. Sound Management Group LLC.
q. Tectum Inc.
r. Wall Technology, Inc.; an Owens Corning company.
s. Working Walls, Inc.

2. Panel Shape: As indicated on Drawings.
3. Mounting: Top-edge mounted with manufacturer’s standard suspension system, secured to Grid; Armstrong Prelude XL, 15/16”.

2.4 MATERIALS

A. Mounting Devices: Concealed on back or top edge of unit, recommended by manufacturer to support weight of unit.

2.5 FABRICATION

A. Standard Construction: Use manufacturer’s standard construction unless otherwise indicated, 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.

B. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:

1. Thickness.
2. Edge straightness.
3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

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 unit performance.

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

A. Install units in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with manufacturer’s written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

C. Align fabric pattern and grain as indicated on Drawings.

3.3 INSTALLATION TOLERANCES

A. Variation from Alignment with Surfaces: Plus or minus 1/16 inch in 48 inches, noncumulative.

B. Variation from Level or Slope: Plus or minus 1/16 inch.

C. Variation of Joint Width: Not more than 1/16 inch wide from reveal line in 48 inches, noncumulative.

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 098436
SECTION 099000 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division Specification sections, apply to this section.

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.
   1. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

B. Paint all exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

C. Work included in this section to be painted:
   1. Painting exposed surfaces as indicated.
   2. Paint exposed ductwork.
   3. Stain and seal woodwork.
   4. Paint exposed woods not scheduled for stain/sealer.
   5. Paint all exposed materials not prefinished by factory.
   6. Paint equipment-mounting boards.
   7. Paint exposed piping, conduit, equipment and supports, except if prefinished with factory painted finish, and as may be noted otherwise.
   8. Paint all exposed steel structure and metal deck as scheduled.
  10. Paint all exterior exposed steel lintels whether indicated on drawings or not.

D. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
   1. Pre-finished items not to be painted include the following factory-finished components:
      a. Toilet compartments.
      b. Acoustic materials, unless indicated otherwise.
      c. Finished mechanical and electrical equipment, unless indicated otherwise.
      d. Light fixtures.
      e. Switchgear, except as indicated.
      f. Distribution cabinets, except where exposed on walls of occupied spaces.
   2. Finished metal surfaces not to be painted include:
      a. Anodized aluminum.
      b. Stainless steel.
      c. Chromium plate.
      d. Copper.
3. Operating parts not to be painted include moving parts of operating equipment such as the following:
   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.

4. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

E. Accent Colors: Allow for change of colors between various groups of rooms and spaces. Allow for graphic wall paint per interior elevations; final graphics to be issued by Architect during construction. Allow for up to eight (8) different interior paint colors.

F. Related Sections: The following sections contain requirements that relate to this section:
   1. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
   2. Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.

G. Shelf Stock: Provide at least one gallon of each color and type of paint, stain, sealer, and coating; labeled as to color and location. Do not use shelf stock for punch list work.

1.3 SUBMITTALS

A. Product Data: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use.
   1. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.

B. LEED Submittals:
   1. Product Data for Credit IEQ 4.2: For interior paints and coatings, documentation including printed statement of VOC content.

C. Mock-Ups:
   1. After color selection, the Architect will furnish color chips for surfaces to be coated, then provide the following for final approval.
      a. Concrete Masonry: Provide two 4-by-8-inch samples of masonry, with mortar joint in the center, for each finish and color.
      b. Painted Wood: Provide two 12-inch-square samples of each color and material on hardboard.
      c. Stained or Natural Wood: Provide two 4-by-8-inch samples of natural and stained wood finish on actual wood surfaces.
      d. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

D. Samples for initial color selection in the form of manufacturer's color charts.
1. After color selection, the Architect will furnish color chips for surfaces to be coated, then provide the following for final approval.

a. Concrete Masonry: Provide two 4-by-8-inch samples of masonry, with mortar joint in the center, for each finish and color.
b. Painted Wood: Provide two 12-inch-square samples of each color and material on hardboard.
c. Stained or Natural Wood: Provide two 4-by-8-inch samples of natural and stained wood finish on actual wood surfaces.
d. Ferrous Metal: Provide two 4-inch-square samples of flat metal and two 8-inch-long samples of solid metal for each color and finish.

E. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect of problems anticipated using the materials specified.

F. Coating Maintenance Manual: Upon completion of the project, the Contractor or paint supplier shall furnish a coating maintenance manual, equal to Sherwin-Williams "Custodian Project Color and Product Information" report. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touchup procedures, and color samples of each color and finish used.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

C. Notify the Architect of problems anticipated using the materials specified.

D. Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 10 sq. ft. of surface until required sheen, color and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.

E. Material Quality: Provide the manufacturer’s best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.
1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
   1. Product name or title of material.
   2. Product description (generic classification or binder type).
   3. Federal Specification number, if applicable.
   4. Manufacturer's stock number and date of manufacture.
   5. Contents by volume, for pigment and vehicle constituents.
   6. Thinning instructions.
   7. Application instructions.
   8. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
   1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F and 90 deg F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include:

   1. Sherwin Williams
   2. I.C.U. Dulux
   3. Benjamin Moore and Co. (Moore)
   4. PPG Industries, Pittsburgh Paints (PPG)
   5. Pratt and Lambert (P & L)
2.2 PAINT MATERIALS, GENERAL

A. See paint schedule at the end of this section.

B. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
5. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
6. Shellacs, Clear: 730 g/L.
7. Shellacs, Pigmented: 550 g/L.

D. Material Quality: Provide the manufacturer’s best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer’s product identification will not be acceptable.

E. Colors: Colors to be selected by Architect from paint manufacturer’s full range of standard colors. Colors may be by different paint manufacturers than specified or selected and will require color match.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.

1. Start of painting will be construed as the Applicator’s acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

1. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer’s instructions for each particular substrate condition and as specified.

1. **Provide barrier coats over incompatible primers or remove and reprime.** Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.

2. **Cementitious Materials:** Prepare concrete masonry block, precast walls, and ceilings and other surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
   a. Use abrasive blast-cleaning or acid etching methods if recommended by the paint manufacturer.
   b. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   c. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
   d. When transparent finish is required, backprime with spar varnish.
   e. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
   f. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

3. **Ferrous Metals:** Clean nongalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.
   a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

4. **Galvanized Surfaces:** Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.

1. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3. Use only thinners approved by the paint manufacturer, and only within recommended limits.

D. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. Apply paint in accordance with manufacturer’s directions. Use applicators and techniques best suited for substrate and type of material being applied.
B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
   1. Paint colors, surface treatments, and finishes are indicated in "schedules."
   2. Provide finish coats that are compatible with primers used.
   3. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
   4. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
   5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
   6. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
      Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
   7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
   8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
   9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
  10. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
  11. Sand lightly between each succeeding enamel or varnish coat.
  12. Omit primer on metal surfaces that have been shop-primed and touch up painted.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

D. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled. Apply additional coats of block filler at infill in existing block walls to match adjacent/surrounding conditions and appearance.

F. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.

G. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surface imperfections.
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

H. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
   1. Provide satin finish for final coats on wood doors.

J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

3.5 PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates indicated. Sherwin Williams Products are listed, equal products by other manufacturers may be acceptable, subject to conformance with requirements.

B. Ferrous Metal: Primer is not required on shop-primed items.
   1. Full-Gloss Alkyd Enamel: 2 finish coats over primer.
      a. Primer: Synthetic Rust-Inhibiting Primer SW Pro-Cryl Universal Metal Primer B66-310.
      b. First Coat: SW-B54 Series Industrial Enamel, gloss.
      c. Second Coat: SW-B54 Series Industrial Enamel, gloss.

C. Zinc-Coated Metal:
   1. High-Gloss Alkyd Enamel: 2 finish coats over primer.
      b. First Coat: Alkyd Gloss Enamel, SW B54 Series Industrial Enamel, gloss.
      c. Second Coat: Alkyd Gloss Enamel, SW B54 Series Industrial Enamel, gloss
3.7 INTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates, as indicated. Not all scheduled substrates may appear on this project.

B. Concrete Masonry Units:

C. Concrete Masonry Units Ø High Durability: (Provide high durability paint at all restrooms, janitor closets, corridors, and as indicated on drawings.) Should use in all high traffic areas, exclude admin offices
   2. Two coats: SW; Pro Industrial Pre-Catalyzed WB Epoxy K45 series.

D. Drywall:
   1. Primer: SW; B28W8200 ProMar 200 Interior Latex Primer.
   2. Two Coats: SW; B20W2200 – Pro Mar 200 interior satin or semi-gloss latex.

E. Drywall: High Durability. (Provide high durability paint at all restrooms, janitor closets, corridors, and as indicated on drawings.)
   2. Two coats: SW;. Pro Industrial Pre-Catalyzed WB Epoxy K45 series.

F. Painted Woodwork and Hardboard:
   1. Undercoat: SW; B49W8820 Multi-Purpose Interior Oil-Based Primer.
   2. Two coats: SW; A76W00051 Solo Semi-gloss interior acrylic.

G. Ferrous Metal: (Interior hollow metal)
   1. Primer: SW B66-310 Pro-Cryl Universal Metal Primer.
   2. Two coats: SW; Pro Industrial Pre-Catalyzed WB Epoxy K46 Semi-gloss.

H. Zinc-Coated Metal:
   1. Primer: B50WZ0030 Galvite HS Solvent Based Acrylic Coating.
   2. Two coats: SW; B31WJ8651 Solo Semi-gloss interior acrylic.

I. Exposed Open Structure and Open Ceiling Areas: Dryfall.
   1. Primer (prime all unfinished surfaces) according to dryfall manufacturer’s recommendations for specific substrates.
   2. Two (2) coats: SW: Waterborne acrylic dryfall B42 series flat finish – Colors may be medium to light tones.

J. CMU Block Sealer: Refer to spec section 042000 for product information.

K. Concrete Substrates (Traffic Surfaces) See Section 033000 for concrete sealer-hardener to be installed at all exposed concrete floors indicated as sealed concrete.

END OF SECTION 099000
SECTION 101100 - VISUAL DISPLAY UNITS

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. Visual display board 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. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
   B. LEED Submittals:
      1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
   C. Shop Drawings: For visual display units.
      1. Include plans, elevations, sections, details, and attachment to other work.
      2. Show locations of panel joints. Show locations of field-assembled joints for factory-fabricated units too large to ship in one piece.
      3. Show locations and layout of special-purpose graphics.
      4. Include sections of typical trim members.
   D. Product Schedule: For visual display units. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For qualified Installer.
B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of tackboards.

C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For visual display units[ and motorized units] to include in maintenance manuals.

1.7 QUALITY ASSURANCE

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

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-fabricated visual display units completely assembled in one piece. 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.

1.9 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.

1.10 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: 50 years from date of Substantial Completion.
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.

B. 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 VISUAL DISPLAY BOARD ASSEMBLY

A. Manufacturers: Subject to compliance with requirements, provide products by the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. AARCO Products, Inc.
   3. ADP Lemco, Inc.
   5. Best-Rite Manufacturing; a brand division of MooreCo, Inc.
   6. Claridge Products and Equipment, Inc.
   7. Egan Visual Inc.
   8. EverWhite; a division of Glenroy, Inc.
   11. Newline Products, Inc.
   12. Peter Pepper Products, Inc.

B. Visual Display Board Assembly: factory fabricated.
   1. Assembly: markerboard.
   2. Corners: Square.
   3. Width: As indicated on Drawings.
   4. Height: As indicated on Drawings.
   5. Mounting Method: Direct to wall.

C. Markerboard Panel: Porcelain-enamel-faced markerboard panel on core indicated.
D. Tackboard Panel: Natural-cork tackboard panel on core indicated.

E. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- thick, extruded aluminum; standard size and shape.
   1. Field-Applied Trim: Manufacturer’s standard, snap-on trim with no visible screws or exposed joints.

F. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.

G. Chalktray: Manufacturer's standard; continuous.
   1. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.

2.4 TACKBOARD PANELS

A. Tackboard Panels:
   1. Facing: 1/4-inch- thick natural cork.
   2. Core: Manufacturer's standard.

2.5 MATERIALS

A. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.

B. Natural-Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.

C. Medium-Density Fiberboard: ANSI A208.2[ ]; made with binder containing no urea formaldehyde.[ ]; that complies with the testing and product requirements of the California Department of Public 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. Fiberboard: ASTM C 208 cellulosic fiber insulating board.

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.

VISUAL DISPLAY UNITS
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 roughing-in for electrical power systems to verify actual locations of connections before installation of motorized, sliding visual display units.

C. Examine walls and partitions for proper preparation and backing for visual display units.

D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.

E. 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.

3.3 INSTALLATION

A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

B. 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.
C. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings.

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.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain motorized, sliding visual display units.

END OF SECTION 101100
SECTION 101423 - PANEL SIGNAGE

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. Panel signs.

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. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Sustainable Design Submittals:
      1. Product Data: For adhesives, indicating VOC content.
      2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
   C. Shop Drawings: For panel signs.
      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 message list, typestyles, graphic elements[, including raised characters and Braille], and layout for each sign at least [half size] <Insert scale>.
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. Full-size Samples, if approved, will be returned to Contractor for use in Project.

E. Product Schedule: For panel signs. Use same designations indicated on Drawings or specified.

1.6 QUALITY ASSURANCE


1.7 FIELD CONDITIONS

A. Field Measurements: Verify locations of [anchorage devices] [and] [electrical service] embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PANEL SIGNS

A. Panel Sign <Insert drawing designation>: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide APCO IM System or comparable product by one of the following:

   a. APCO Graphics, Inc.
   b. ASI Sign Systems, Inc.
   c. Best Sign Systems, Inc.
   d. InPro Corporation (IPC).

2. Solid-Sheet Sign[ and Returns][, Returns, and Back]: Aluminum sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph and as follows:

   a. Thickness: 0.080 inch.
   b. Surface-Applied, Flat Graphics: Applied [vinyl film] [baked enamel or powder coat] [paint] [photo image] <Insert requirement>.
   d. Etched and Filled Graphics: Sign face etched or routed to receive enamel-paint infill.
   e. Inset, Cutout Characters: Sign face routed to receive push-through acrylic graphics [flush with] [slightly projecting from] the sign panel.
2.2 PANEL-SIGN MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

2.3 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. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.

6. 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.

B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into indicated sign surface to produce precisely formed copy, incised to uniform depth.

1. Engraved Metal: Fill engraved graphics with manufacturer's standard baked enamel.

2. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.


4. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.

C. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

D. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

E. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.
F. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:

1. For snap-in changeable inserts beneath removable face sheet, furnish one suction or other device to assist in removing face sheet. Furnish initial changeable insert. [Subsequent changeable inserts are by Owner] [Furnish two blank inserts for each sign for Owner’s use] <Insert requirement>.
2. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. [Subsequent changeable inserts are by Owner] [Furnish two blank inserts for each sign for Owner’s use] <Insert requirement>.
3. For frame to hold changeable sign panel, fabricate frame without burrs or constrictions that inhibit function. Furnish initial sign panel. [Subsequent changeable sign panels are by Owner] <Insert requirement>.

G. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer’s standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish [to match sign-background color] [to match Architect’s sample] <Insert requirement> color unless otherwise indicated.
2. Stainless-Steel Brackets: Factory finish brackets [to match sign background] [to match Architect’s sample] [with No. 4] <Insert finish> finish unless otherwise indicated.

2.4 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.

2.5 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.
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. 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.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

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. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.

C. Mounting Methods:

1. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
2. 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.
3. Shim-Plate Mounting: Provide 1/8-inch- thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using <Insert mounting method> method specified above.

D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish 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.
SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

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-plastic toilet compartments configured as toilet enclosures urinal screens.
   B. Related Requirements:
      1. Section 061053 "Miscellaneous Rough Carpentry" for blocking.

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 toilet compartments.
   B. LEED Submittals:
      1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   C. 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.
      5. Show overhead support or bracing locations.
   D. Samples for Initial Selection: For each type of toilet compartment material indicated.
      1. Include Samples of hardware and accessories involving material and color selection.
   E. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-square Samples of same thickness and material indicated for Work.

2. Each type of hardware and accessory.

F. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

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 MAINTENANCE MATERIAL SUBMITTALS

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

1. Door Hinges: One hinge(s) with associated fasteners.

2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.

3. Door Bumper: One bumper(s) with associated fasteners.

4. Door Pull: One door pull(s) with associated fasteners.

5. Fasteners: Ten fasteners of each size and type.

1.7 PROJECT 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.

PART 2 - PRODUCTS

2.1 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.

B. Regulatory Requirements: Comply with applicable provisions in ICC A117.1 for toilet compartments designated as accessible.
2.2 SOLID-PLASTIC TOILET COMPARTMENTS (TP-1)

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. Accurate Partitions Corporation.
2. Bradley Corporation; Mills Partitions.
3. Global Steel Products Corp.
5. Marlite.

B. Toilet-Enclosure Style: Overhead braced Floor anchored.

C. Urinal-Screen Style: Wall hung.

D. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.

E. Pilaster Shoes and: Manufacturer's standard design; stainless steel.

F. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum stainless steel.

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 paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, 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.
5. Doors 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 MATERIALS

A. Aluminum Castings: ASTM B 26/B 26M.

B. Aluminum Extrusions: ASTM B 221.

C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

D. Stainless-Steel Castings: ASTM A 743/A 743M.

2.5 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-Anchored Units: 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. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at bottoms of posts. Provide shoes at posts to conceal anchorage.

E. 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.

   a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
   b. Align brackets at pilasters with brackets at walls.

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 and doors in entrance screens to return doors to fully closed position.
END OF SECTION 102113.19
SECTION 102213 - WIRE MESH PARTITIONS

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. Heavy-duty wire mesh partitions.

1.3 DEFINITIONS

A. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.

B. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:
   1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Shop Drawings:
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Indicate clearances required for operation of [service windows] [doors] [and] [gates].

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: 12-by-12-inch panel constructed of specified frame members and wire mesh. Show method of finishing members at intersections.

F. Delegated-Design Submittal: For wire mesh partitions indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1.5 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer.
   B. Welding certificates.

1.6 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For wire mesh partition hardware to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS
   A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      1. Door Locks: Furnish 5 percent of quantity installed for each type indicated, but no fewer than <Insert number> locks.

1.8 QUALITY ASSURANCE
   A. Installer Qualifications: [Fabricator of products] [An employer of workers trained and approved by manufacturer].
   B. Welding Qualifications: Qualify procedures and personnel according to the following:
      1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
      2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.9 DELIVERY, STORAGE, AND HANDLING
   A. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped palleted crated to provide protection during transit and Project-site storage. Use vented plastic.
   B. Inventory wire mesh partition door hardware on receipt, and provide secure lockup for wire mesh partition door hardware delivered to Project site.

1.10 FIELD CONDITIONS
   A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following providers:

1. Acorn Wire & Iron Works, LLC.
5. Folding Guard Corporation.
7. Indiana Wire Products, Inc.
10. King Wire Partitions, Inc.
11. Miller Wire Works, Inc.
12. Newark Wire Works Inc.
13. R. J. Donaldson, Inc.
14. SpaceGuard Products.
15. Standard Wire & Steel Works.
16. Wire Crafters, LLC.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Wire mesh units shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft. at any location on a panel.
2. Total load of 200 lbf applied uniformly over each panel.
3. Concentrated load and total load need not be assumed to act concurrently.

B. Seismic Performance: Wire mesh units shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor: 1.5.

2.3 MATERIALS

A. Steel Wire: ASTM A 510.
B. Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M.
C. Steel Sheet: Cold-rolled steel sheet, ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
D. Steel Pipe: ASTM A 53/A 53M, Schedule 40, unless another weight is indicated or required by structural loads.
E. Steel Tubing: ASTM A 500/A 500M, cold-formed structural-steel tubing or ASTM A 513, Type 5, mandrel-drawn mechanical tubing.

F. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.

G. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.

H. Post-Installed Anchors: Capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 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.

1. Material for Interior Locations: Carbon-steel components are zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.


I. Power-Driven Fasteners: ICC-ES AC70.

J. Seismic Bracing: Angles with legs not less than 1-1/4 inch wide, formed from 0.040-inch-thick, metallic-coated steel sheet; with bolted connections and 1/4-inch-diameter bolts.

K. Low-Emitting Coatings: Paints and coatings shall comply with the testing and product requirements of the California Department of Public 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."

L. Shop Primers: Provide primers that comply with [Section 099113 "Exterior Painting"] [and] [Section 099123 "Interior Painting."]

M. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer, complying with MPI#79.


2.4 HEAVY-DUTY WIRE MESH PARTITIONS

A. Mesh: 10 gauge, intermediate-crimp steel wire woven into 1.5 inch diamond mesh.

B. Mesh: 10 gauge steel wire, resistance welded into 2-by-1 inch rectangular mesh.

C. Vertical and Horizontal Panel Framing: 1-1/2-by-3/4-by-1/8-inch cold-rolled steel channels; with holes for 3/8-inch-diameter bolts not more than 12 inches o.c.

D. Horizontal Panel Stiffeners: Two cold-rolled steel channels, 1 by 1/2 by 1/8 inch, bolted or riveted toe to toe through mesh.

E. Top Capping Bars: 3-by-1-inch steel channels.
F. Posts for 90-Degree Corners: 1-1/2-by-1-1/2-by-1/8-inch steel angles or tubes or 2-by-2-by-0.075-inch cold-rolled steel angles or tubes, with holes for 3/8-inch diameter bolts aligning with bolt holes in vertical framing; with 1/4-inch steel base plates.

G. Adjustable Corner Posts: Two 1-1/2-by-3/4-by-1/8-inch cold Rolled, steel channels or 2-by-2-by-0.075-inch steel tubes connected by steel hinges at 36 inches o.c. attached to posts; with 1/4-inch diameter bolt holes aligning with bolt holes in vertical framing; with 1/4-inch steel base plates.

H. Line Posts: 3-inch-by-4.1-lb or 3-1/2-by-1-1/4-by-1/8-inch steel channels; with 1/4-inch steel base plates.

I. Three-Way Intersection Posts: 2-by-2-by-0.075-inch steel tubes, with holes for 3/8-inch diameter bolts aligned for bolting to adjacent panels; with 1/4-inch steel base plates.

J. Floor Shoes: Metal, not less than 2 inches high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.

K. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch steel channels, banded with 1-1/2-by-1/8-inch flat steel bar cover plates on four sides, and with 1/8-inch thick angle strike bar and cover on strike jamb.

1. Hinges: Full-surface type, 3-1/2-by-3-1/2-inch steel, three per door; bolted, riveted, or welded to door and jamb framing.
2. Padlock Lug: Mortised into door framing and enclosed with steel cover.
3. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.

L. Accessories:
1. Wall Clips: Manufacturer’s standard, cold-rolled steel sheet; allowing up to 1 inch of adjustment.

M. Finish: Powder-coated finish unless otherwise indicated.

1. Color: As selected by Architect from manufacturer’s full range.

2.5 FABRICATION

A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. Furnish bolts, hardware, and accessories required for complete installation with manufacturer’s standard finishes.

1. Fabricate wire mesh items to be readily disassembled.
2. Welding: Weld corner joints of framing and grind smooth, leaving no evidence of joint finish sand remove spatter.

B. Heavy-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.

1. Mesh: Weld mesh to framing.
2. Framing: Fabricate framing with mortise and tenon corner construction.
a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
b. Fabricate three- and four-way intersections using intersection posts manufacturer’s standard connecting clips and fasteners.
c. Fabricate partition and door framing with slotted holes for connecting adjacent panels.

3. Fabricate wire mesh partitions with 3 to 4 inches of clear space between finished floor and bottom horizontal framing.
4. Fabricate wire mesh partitions with bottom horizontal framing flush with finished floor.
5. Doors: Align bottom of door with bottom of adjacent panels.
   a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.

6. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

2.6 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 items of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Shop Priming: Apply shop primer to uncoated surfaces of wire mesh units unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

E. Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer’s standard enamel finish, suitable for use indicated, with a minimum dry film thickness of 2 mils.
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

F. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on powder-coat finish, suitable for use indicated, with a minimum dry film thickness of [2 mils] <Insert dimension>.
   1. Color and Gloss: As indicated by manufacturer’s designations As selected by Architect from manufacturer's full range Insert color and gloss.
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. Examine floors for suitable conditions where wire mesh items will be installed.

C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRE MESH PARTITIONS ERECTION

A. Anchor wire mesh partitions to floor with 3/8-inch-diameter postinstalled expansion anchors at 12 inches o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.

1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.

B. Anchor wire mesh partitions to floor with 3/8-inch-diameter postinstalled expansion anchors at 12 inches o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.

1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.

C. Anchor wire mesh partitions to walls at 12 inches o.c. through back corner panel framing and as follows:

1. For concrete and solid masonry anchorage, use expansion anchors.
2. For hollow masonry anchorage, use toggle bolts.
3. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
4. For steel-framed gypsum board assemblies, use lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

D. Secure top capping bars to top framing channels with 1/4-inch-diameter "U" bolts spaced not more than 28 inches o.c.

E. Provide line posts at locations indicated or, if not indicated, as follows:

1. On each side of sliding-door openings.
2. For partitions that are 7 to 9 feet high, spaced at 15 to 20 feet o.c.
3. For partitions that are 10 to 12 feet high, located between every other panel.
4. For partitions that are more than 12 feet high, located between each panel.
F. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.

G. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.

H. Install doors complete with door hardware.

I. Install service windows complete with window hardware.

J. Weld or bolt sheet metal bases to [wire mesh partitions] [and] [doors] [where indicated].

K. Bolt accessories to wire mesh partition framing.

3.3 ADJUSTING AND CLEANING

A. Adjust doors to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Remove and replace defective work, including doors and framing that are warped, bowed, or otherwise unacceptable.

C. 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.

D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 102213
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. Furnish and install operable partitions and suspension system. Provide all labor, materials, tools, equipment, and services for operable walls in accordance with provisions of contract documents.

1.3 RELATED WORK BY OTHERS
   A. Preparation of opening will be by General Contractor. Any deviation of site conditions contrary to approved shop drawings must be called to the attention of the architect.
   B. All header, blocking, support structures, jambs, track enclosures, surrounding insulation, and sound baffles as required in 1.4 Quality Assurance.
   C. Pre-punching of support structure in accordance with approved shop drawings.
   D. Paint or otherwise finishing all trim and other materials adjoining head and jamb of operable partitions.

1.4 SUBMITTALS
   A. Complete shop drawings are to be provided prior to fabrication indicating construction and installation details. Shop drawings must be submitted within (60) days after receipt of signed contract.

1.5 QUALITY ASSURANCE
   A. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.
   B. The partition STC (Sound Transmission Classification) shall be achieved per the standard test methods ASTM E90.
   C. Noise isolation classifications shall be achieved per the standard test methods ASTM E336 and ASTM E413.

SECTION 102226 - FOLDING PARTITION PANELS
D. Noise Reduction Coefficient (NRC) ratings shall be per ASTM C423.
E. Rack testing for 10 years. (tensile strength stress test)
F. The manufacturer shall have a quality system that is registered to the ISO 9001 standards.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING
A. Proper storage of partitions before installation and continued protection during and after installation will be the responsibility of the General Contractor.

1.7 WARRANTY
A. Partition system shall be guaranteed for a period of Ten years, from the project's date of substantial completion, against defects in material and workmanship, excluding abuse starting at the date of substantial completion.

PART 2 - PRODUCTS

2.1 OPERABLE ACOUSTICAL PANELS
A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.

1. Basis of Design Product: Subject to compliance with requirements provide Modernfold, Inc.; Encore or comparable product by one of the following:
   a. Hufcor, Inc
   b. KWIK-WALL Company.
   c. Moderco Inc.
   d. Panelfold Inc.

B. Panels shall be nominally 3" thick, to 48" in width, and hinged in pairs.
C. Panel faces shall be laminated to appropriate substrate to meet the STC requirement in 2.4 Acoustical Performance.
D. Frames shall be of 16 gauge [1.42mm] painted steel with integral factory applied aluminum vertical edge and face protection. Optional: Face finish shall wrap around the vertical panel edges and provide no protective vertical face trim.
E. Vertical sound seals shall be of tongue and groove configuration, ensure panel-to-panel alignment and prevent sound leaks between panels.
F. Horizontal top seals shall be fixed continuous contact dual 4-finger vinyl.
G. Horizontal bottom seals shall be retractable, provide up to 2" nominal operating clearance, and exert downward force when extended. Optional Seals:
1. Horizontal bottom seals shall be automatic and provide up to 2" nominal operating clearance.
2. Horizontal bottom seals shall be fixed continuous contact dual 4-finger vinyl.
3. Horizontal trim shall be of aluminum.
4. Low profile hinges on basic panels shall be of steel and project no more than 1/4" beyond panel faces. Each pair of panels to have a minimum of three hinges.

H. Weight of the panels shall be 5.7-10.2 lbs. per sq. ft. based on options selected.

I. Pass Door: Single door, 36 inch wide x 84 inch high opening; same design and construction as panel; fit door with self-illuminated exit sign, perimeter acoustic gaskets, concealed closer, and friction latch and flush pulls for panic operation. No threshold will be permitted.

J. Suspension system:

1. Track shall be of clear anodized architectural grade extruded aluminum alloy 6063-T6. Track design shall provide precise alignment at the trolley running surfaces and provide integral support for adjoining ceiling, soffit, or plenum sound barrier. Track shall be connected to the structural support by pairs of minimum 3/8" dia. threaded steel hanger rods. Guide rails and/or track sweep seals shall not be required.

   a. Each panel shall be supported by one 4-wheeled carrier. Wheels to be of hardened steel ball bearings encased with molded polymer tires.

2. Plenum closure: Design of plenum closure must permit lifting out of header panels to adjust track height. Plenum closure required for optimum sound control of partition.

K. Finishes

1. Face finish shall be:

   a. Factory applied reinforced vinyl fabric with woven backing, weighing not less than 15 oz. per lineal yard [465 g/m]. Color shall be selected from manufacturer's full range of colors/finishes.

2. Exposed metal trim and seal color shall be selected by the Architect from the manufacturer's full range of available colors/finishes.

3. Aluminum track shall be Custom powder coated, color to be provided by Architect.

2.2 OPERATION

A. Panels shall be manually moved from the storage area, positioned in the opening, and seals set.

B. Retractable Horizontal Seals

1. Retractable horizontal seals shall be activated by a removable quick-set operating handle located approximately 42" from the floor in the panel edge.

2. All retractable seals in each hinged pair shall be operated simultaneously.

3. Seal activation requires approximately 15 lbs. of force per panel and approximately a 190 degree turn of the removable handle.

C. Automatic Floor Seals
1. Horizontal seals shall be activated by pressing the edge of the panel into the edge of the adjacent panel or wall.
2. Seal activation requires approximately 15 lbs. [6.8 kg] of force per panel.

D. Final partition closure to be by:

1. Lever closure panel with expanding jamb which compensates for minor wall irregularities and provides a minimum of 250 lbs. [113.4kg] seal force against the adjacent wall for optimum sound control. The jamb activator shall be located approximately 45" [1143] from the floor in the panel face and be accessed from either side of the panel. The jamb is equipped with a mechanical rack and pinion gear drive mechanism and shall extend 4"-6" [100-152] by turning the removable operating handle.
2. Pivot Panel (Optional for heights to 12'3" [3734] and a maximum of 10 panels): Pivot panel is attached to the wall and permits access between adjacent rooms. Pivot panel is of the same construction as basic panels but with continuous contact multi-ply vinyl top and bottom seals. The lead end of the panel has full height finger pull and vertical seal of multi-ply vinyl.

E. Stack/Store Panels

1. Retract seals and move to storage area. Panels may be stored at either or both ends of the track or in a pocket.

2.3 ACoustical PERFORMANCE

A. Acoustical performance shall be tested at a laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and in accordance with ASTM E90 Test Standards.

1. STC Not less than 52
2. NRC: Not less than 0.90

B. Complete, unaltered written test report is to be made available upon request.

PART 3 - EXECUTION

A. The complete installation of the operable wall system shall be by an authorized factory-trained installer and be in strict accordance with the approved shop drawings and manufacturer's standard printed specifications, instructions, and recommendations.

B. Cleaning

1. All track and panel surfaces shall be wiped clean and free of handprints, grease, and soil.
2. Cartons, trash and other installation debris shall be removed to onsite waste collection area, provided by others.

C. Training

1. Installer shall demonstrate proper operation and maintenance procedures to owner's representative.
2. Operating handle and owner's manuals shall be provided to owner's representative.
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO  
Project Number T1809-01  

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

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. Public-use washroom accessories.
      2. Public-use shower room accessories.
      3. Warm-air dryers.
      4. Under-lavatory guards.
      5. Custodial accessories.
   B. Owner-Furnished Material:
      1. Paper towel dispensers, contractor installed.
      2. Soap dispensers, contractor installed.
      3. Toilet tissue dispensers, contractor installed.

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.
      2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS
   A. Warranty: Sample of special warranty.
1.5 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE
   A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
   B. 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.

1.7 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.

1.8 WARRANTY
   A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
      1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS
   A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
   B. 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.
   C. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
   D. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings by Bobrick Washroom Equipment, Inc. or comparable product by one of the following:
   1. A & J Washroom Accessories, Inc.
   2. American Specialties, Inc.

B. Grab Bar (GB, GBA and GBL):
   3. Material: Stainless steel, 0.05 inch thick.
      a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
   5. Grab Bar (GB) 1-48 inches long
   7. Grab Bar L-Configuration: GBL
      a. 1-42 inches long, horizontal
      b. 1-36 inches long, horizontal
      c. 1-18 inches long, vertical

C. Feminine Napkin Receptacle (NR):
   4. Door or Cover: Top opening lid with integral finger depression.
   5. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Feminine Napkin Dispenser (ND)
   1. Basis-of-Design Product: Bobrick #B-2800x230

E. Waste Receptacle (WR)
   1. Basis-of-Design Product: Bobrick #B-2250

F. Paper Towel Dispenser (PTD)
   1. Basis-of-Design Product: Bobrick #B-262

G. Toilet Paper Dispenser (TPD)
   1. Basis-of-Design Product: Bobrick #B-2892

H. Mirror Unit (MI, M2 and M3):
   1. Basis-of-Design Product: Bobrick #B290
   2. Frame: Stainless-steel angle, 0.05 inch thick.
      a. Corners: Welded and ground smooth.
      a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
   4. Size:
      a. M1 – 18" wide x 36" high
2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings by Bobrick Washroom Equipment, Inc. or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
4. GAMCO Specialty Accessories
5. Tubular Specialties Manufacturing, Inc.

B. Folding Shower Seat (SSL):

1. Basis-of-Design Product: Bobrick #B-5181, reversible hand folding shower seat ADA, ivory phenolic.
2. Configuration: L-shaped seat, designed for wheelchair access.
3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.

C. Double Coat Hook (CH):

1. Basis of Design: Bobrick B672 Double Robe Hook
2. Size: 4" wide, projects 2 5/16"
3. Material: Bright polished stainless steel
4. Mounting: Concealed with cap plate welded to support arm

2.4 WARM-AIR DRYERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings by GAMCO Specialty Accessories or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Dryer, Inc.
3. American Specialties, Inc.
5. Bradley Corporation.
7. World Dryer Corporation.

B. Warm-Air Dryer (HD):

   a. Operation Time: 90 max. seconds.
5. Electrical Requirements: Refer to electrical drawings.

2.5 UNDERLAVATORY GUARDS

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. Plumberex Specialty Products, Inc.: Trap & Gear (800) 475-8629
   2. IPS Corp.: Soft-Guard Plus (800) 888-8312

B. Underlavatory Guard :
   1. Description: ADA compliant insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.

2.6 CUSTODIAL ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings by
   1. Bobrick Washroom Equipment, Inc. or comparable product by one of the following:
      1. A & J Washroom Accessories, Inc.
      2. American Specialties, Inc.
      4. GAMCO Specialty Accessories
      5. Tubular Specialties Manufacturing, Inc.

B. Mop and Broom Holder (MBH):
   2. Description: Surface-mounted mop/broom holder with handles 7/8” to 1 ¼” diameter.
   3. Length: 36 inches.
   5. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Stainless Steel Splash Guard (SG):
   1. Basic of Design: Custom cut 304 stainless steel splash guards by QuixShipMetals, Athens, TN (888) 334-2177 or comparable products by available manufacturers.

2.7 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. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to 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
SECTION 104413 - FIRE PROTECTION CABINETS

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 for the following:
         a. Portable fire extinguishers.
   B. Related Requirements:
      1. Section 104416 "Fire Extinguishers."

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 recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
   B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION
   A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
   B. Coordinate sizes and locations of fire-protection cabinets with wall depths.
PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET <Insert drawing designation>

A. Cabinet Type: Suitable for fire extinguisher.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Guardian Fire Equipment, Inc.
      b. JL Industries, Inc.; a division of the Activar Construction Products Group.
      c. Larsens Manufacturing Company.
      d. Nystrom, Inc.
      e. Potter Roemer LLC.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Stainless-steel sheet.
   1. Shelf: Same metal and finish as cabinet.

D. Semirecessed 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: Vertical duo panel with frame.

H. Door Glazing: Tempered float glass (clear).

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

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. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
   3. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
   4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate [as indicated] [as directed by Architect] <Insert 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: Black.
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)] [Class 2 (tinted, heat absorbing, and light reducing), bronze tint].

2.2 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.

2.3 GENERAL FINISH REQUIREMENTS


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 semirecessed cabinets will be installed.

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

3.2 PREPARATION

A. Prepare recesses for semirecessed 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 inside latch and lock for break-glass panels.
2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

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
SECTION 105113 - METAL LOCKERS

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. Welded OCIE lockers
   2. Welded personnel lockers.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of metal locker.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.

B. Shop Drawings: For metal lockers.
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Show locker trim and accessories.
   3. Include locker identification system and numbering sequence.

C. Samples: For each color specified, in manufacturer's standard size.

D. Samples for Verification: For the following products, in manufacturer's standard size:
   1. Lockers and equipment.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranty: For special warranty.
1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

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

1. Full-size units of the following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than five units:

   a. Locks.
   b. Identification plates.
   c. Hooks.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

B. Deliver master and control keys to Owner by registered mail or overnight package service.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate sizes and locations of concrete masonry bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

   1. Failures include, but are not limited to, the following:

      a. Structural failures.
      b. Faulty operation of latches and other door hardware.

   2. Damage from deliberate destruction and vandalism is excluded.
3. Warranty Period for Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.

   1. Obtain locks from single lock manufacturer.

B. Basis-of-Design Product Type 1 Locker OCIE: Subject to compliance with requirements, provide Spacesaver FreeStyle Personal Duty Storage Lockers or comparable product by one of the following:
   2. Tiffin Metal Products, Inc.
   3. Hallowell

C. Products for Type 2 and Type 3 and Type 4 Lockers: Subject to compliance with requirements, provide one of the following:
   2. Tiffin Metal Products, Inc.
   3. Hallowell

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines ICC A117.1.

2.3 WELDED LOCKERS - OCIE (TYPE 1)

A. Size:
   1. Type 1 - 30" W x 24" D x 36" H. Two Tier OCIE lockers (72" high total) with sloped top and 4" high metal base.

B. Perforated Doors: Box construction double thickness One piece; fabricated from 12 ga (0.105-inch) nominal-thickness steel sheet with manufacturer’s standard diamond perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges latch point (bottom) and right-angle single bend at remaining edges for box lockers.

   1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.

C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

   1. Tops and Bottoms: 14 ga (0.075-inch) nominal thickness, with single bend at edges.
2. Backs: 16 ga (0.060-inch) nominal thickness.
3. Shelves: 14 ga (0.075-inch) nominal thickness, with double bend at front and single bend at sides and back. Provide integral hanger bracket.

D. Unperforated Sides: Fabricated from 16 ga (0.060-inch) nominal-thickness steel sheet.
E. Perforated Sides: Fabricated from 14 ga (0.075-inch) nominal-thickness steel sheet with manufacturer's standard diamond perforations.
F. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.

G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking.
   a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.120-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.

H. Locks: Lock hasp and Combination padlocks.
I. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.
J. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.
L. Continuous Sloping Tops: Fabricated from 16 gauge (0.060-inch) nominal-thickness steel sheet, with a pitch of approximately 20 degrees.

1. Closures: Vertical Hipped-end type.

M. Metal Base: 4” high manufacturers standard zee base.
N. Finish: Baked enamel or powder coat.
   1. Color: As selected by Architect from manufacturer's full range.

2.4 LOCKERS (TYPE 2 and TYPE 3 and TYPE 4)
A. Sizes:
  1. Type 2 - 15” x 15” x 36” H. Two Tier lockers (72” high total) with sloped tops
  2. Type 3 - 12” x 12” x 72 H. Single Tier Lockers with sloped top and 4” high metal base.
3. Type 4 – 15” x 15” x 72”H. Single Tier Lockers with sloped top and 4” high metal base.

B. Perforated Doors: One piece; fabricated from 14 ga (0.075-inch) nominal-thickness steel sheet with manufacturer’s standard diamond perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges latch point (bottom) and right-angle single bend at remaining edges for box lockers.

   1. Reinforcement: Manufacturer’s standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.

C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

   1. Tops and Bottoms: 16 ga (0.060-inch) nominal thickness, with single bend at edges.
   2. Backs: 18 ga (0.048-inch) nominal thickness.
   3. Shelves: 16 ga (0.060-inch) nominal thickness, with double bend at front and single bend at sides and back.

D. Unperforated Sides: Fabricated from 0.048-inch nominal-thickness steel sheet.

E. Perforated Sides: Fabricated from 0.060-inch nominal-thickness steel sheet with manufacturer’s standard diamond perforations.

F. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

   1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.

G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.

   1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking.

      a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.120-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.

H. Locks: Combination padlocks.

I. Identification Plates: Manufacturer’s standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

J. Hooks: Manufacturer’s standard ball-pointed type, aluminum or steel; zinc plated.

K. Coat Rods: Manufacturer’s standard.

L. Continuous Sloping Tops: Fabricated from 18 gauge (0.048-inch) nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
1. Closures: Vertical Hipped-end type.

M. Metal Base: 4” high manufacturers standard zee base.

N. Finish: Baked enamel or powder coat.
   1. Color: As selected by Architect from manufacturer’s full range.

2.5 LOCKS

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. American Locker Company; A Division of Master Lock Company, LLC.
   2. Master Lock Company, LLC.
   3. Zephyr Lock LLC.

B. Combination Padlocks: Key-controlled, three-number dialing combination locks; capable of five combination changes.

2.6 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
   1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
   2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Equipment: Provide each locker with an identification plate and the following equipment:
   1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
   2. Coat Rods: For each compartment of each locker.

D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.

E. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
   1. Sloping-top corner fillers, mitered.

F. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
G. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
   1. Provide one-piece panels for double-row (back-to-back) locker ends.

2.7 ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.
   1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
   2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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. General: Install lockers level, plumb, and true; shim as required, using concealed shims.
   1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
   2. Anchor single rows of metal lockers to walls near top [and bottom of lockers] [of lockers and to floor].
   3. Anchor back-to-back metal lockers to floor.

B. Welded Lockers: Connect groups together with standard fasteners, with no exposed fasteners on face frames.

C. Equipment:
   1. Attach hooks with at least two fasteners.
   2. Attach door locks on doors using security-type fasteners.
   3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
Design and Construct TASMG Readiness Center - Army Aviation Site - Springfield, MO
Project Number T1809-01

METAL LOCKERS

a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.

D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
   1. Attach recess trim to recessed metal lockers with concealed clips.
   2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
   3. Attach sloping-top units to metal lockers, with closures at exposed ends.
   4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
   5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

3.3 ADJUSTING
A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

3.4 PROTECTION
A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105113
SECTION 122413 - ROLLER WINDOW SHADES

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. Manually operated roller shades with single and double rollers.

B. Related Requirements:
   1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
   2. Section 079200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, 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 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. Samples for Verification: For each type of roller shade.
   1. Shadeband Material: Not less than [10 inches ] [3 inches ] square. Mark interior face of material if applicable.
   2. Roller Shade: Full-size operating unit, not less than 16 inches wide by 36 inches long for each type of roller shade indicated.
3. Installation Accessories: Full-size unit, not less than 10 inches long.

F. 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 shadeband material.

C. Product Test Reports: For each type of shadeband material, for tests performed by [manufacturer and witnessed by a qualified testing agency] [a qualified testing agency].

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than [two] <Insert number> units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

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

1.8 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.
1.9  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.

PART 2 - PRODUCTS

2.1  MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Lutron Electronics, Co. The Classico Collection manual system or comparable product by one of the following:

1. Draper Inc.
3. MechoShade Systems, Inc.
4. Qmotion Shades.
5. Silent Gliss.

B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

   a. Loop Length: Full length of roller shade.
   b. Limit Stops: Provide upper and lower ball stops.
   c. Chain-Retainer Type: Clip, jamb mount.

2. Spring Lift-Assist Mechanisms: Manufacturer’s standard for balancing roller shade weight and for lifting heavy roller shades.
   a. Provide for shadebands that weigh more than [10 lb ] <Insert value> or for shades as recommended by manufacturer, whichever criterion is more stringent.

C. 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: Right side of interior face of shade.
2. Direction of Shadeband Roll: [Regular, from back (exterior face) of roller] [Reverse, from front (interior face) of roller].
D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

F. Shadebands:
   1. Shadeband Material: Basketweave 90 Series, 100% recyclable, FR, and PVC free shadecloths, approximately 10% open.
   2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
      a. Type: Enclosed in sealed pocket of shadecloth material.
      b. Color and Finish: As indicated on Finish Legend in the Drawings.

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 4 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 height required to enclose roller and shadeband assembly when shade is fully open, but not less than 4 inches.
   3. Endcap Covers: To cover exposed endcaps.
   4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure 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 assembly when shade is fully open, but not less than 6 inches.
      b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
   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: [As indicated on Drawings] 2 inches.
   6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadecloth guides or other means of aligning shadecloths with channels at tops.
   7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
8. Installation Accessories Color and Finish: [As selected from manufacturer's full range] <Insert color and finish>.

2.2 MANUALLY OPERATED SHADES WITH DOUBLE ROLLERS

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

   a. Loop Length: Full length of roller shade.
   b. Limit Stops: Provide upper and lower ball stops.
   c. Chain-Retainer Type: Clip, jamb mount.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
   a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criterion is more stringent.

B. 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. Double-Roller Mounting Configuration: [Side by side] [Offset, outside roller over and inside roller under] <Insert requirements>.

2. Inside Roller:
   a. Drive-End Location: Right side of interior face of shade.
   b. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.

3. Outside Roller:
   a. Drive-End Location: Right side of interior face of shade.
   b. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.


C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.

D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

E. Inside Shadebands:

1. Shadeband Material: Basketweave 90 Series, 100% recyclable, FR, and PVC free shadecloths, approximately 10% open.
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
a. Type: Enclosed in sealed pocket of shadeband material.
b. Color and Finish: [As selected by Architect from manufacturer’s full range] <Insert color and finish>.

F. Outside Shadebands:

2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

G. Installation Accessories:

1. Endcap Covers: To cover exposed endcaps.
2. Installation Accessories Color and Finish: [As selected from manufacturer’s full range] <Insert color and finish>.

2.3 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. 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.

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 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer’s written instructions.
3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 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.

3.5 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
SECTION 123661.16 - SOLID SURFACING COUNTERTOPS

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 surface material countertops.
   2. Solid surface material backsplashes.
   3. Solid surface material end splashes.
   4. Solid surface material apron fronts.
   5. Solid surface window stools.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
   1. Show locations and details of joints.
   2. Show direction of directional pattern, if any.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:
   1. Countertop material, 6 inches square.
   2. Wood trim, 8 inches long.
   3. One full-size solid surface material countertop, with front edge[ and backsplash], 8 by 10 inches , of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.
1.5 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE
   A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
   B. Installer Qualifications: Fabricator of countertops.
   C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
      1. Build mockup of typical countertop 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 FIELD CONDITIONS
   A. Field Measurements: Verify dimensions of countertops by field measurements[ after base cabinets are installed but] before countertop fabrication is complete.

1.8 COORDINATION
   A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS
   A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
      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. Avonite Surfaces.
         c. Formica Corporation.
         d. Wilsonart International Holdings, Inc.
2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom.

B. Configuration:

1. Front: As indicated on Drawings.
2. Backsplash: As indicated on Drawings.
3. End Splash: Matching backsplash where indicated.

C. Countertops: 1/2-inch-thick, solid surface material with front edge built up with same material.

D. Backsplashes: 1/2-inch-thick, solid surface material.

E. Fabricate tops with shop-applied edges and backslashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backslashes for field assembly.

F. Joints: Fabricate countertops without joints.

G. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
   a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
   b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.


3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 WINDOW STOOL FABRICATION

A. Fabricate window stools according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom

B. Configuration: As indicated on Drawings.
C. Joints: Fabricate window stools without joints.

2.4 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.
   1. Adhesives shall have a VOC content of 70 g/L or less.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

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

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to solid surface material manufacturer’s written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer’s written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

   1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.16
SECTION 123661.19 - QUARTZ AGGLOMERATE COUNTERTOPS

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. Quartz agglomerate countertops.
   2. Quartz agglomerate backsplashes.
   3. Quartz agglomerate end splashes.
   4. Quartz agglomerate apron fronts.

1.3 ACTION SUBMITTALS
A. Product Data: For countertop materials.
B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
   1. Show locations and details of joints.
   2. Show direction of directional pattern, if any.
C. Samples for Initial Selection: For each type of material exposed to view.
D. Samples for Verification: For the following products:
   1. Countertop material, 6 inches square.
   2. Wood trim, 8 inches long.
   3. One full-size quartz agglomerate countertop, with front edge[ and backsplash], 8 by 10 inches, of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For fabricator.
1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include Product Data for care products used or recommended by installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

   1. Build mockup of typical countertop 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 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements[ after base cabinets are installed but] before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

   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. Cambria.
      b. Cosentino USA.
      d. LG Chemical, Ltd.
      e. Meganite Inc.
      f. Samsung Chemical USA, Inc.
      g. Technistone USA, Inc.
2. Colors and Patterns: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range].

B. Particleboard: ANSI A208.1, Grade M-2.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom.

B. Configuration:

1. Front: As indicated on Drawings.
2. Backsplash: As indicated on Drawings.
3. End Splash: Matching backsplash where indicated.

C. Countertops: 3/4-inch thick, quartz agglomerate with front edge built up with same material.

D. Backsplashes: 3/4-inch thick, quartz agglomerate.

E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
   a. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.


3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by quartz agglomerate manufacturer.
1. Adhesives shall have a VOC content of 70 g/L or less.
2. Adhesive 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."

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

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

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer’s written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer’s written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer’s written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

1. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

   1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.19
SECTION 142123.16 - MACHINE-ROOM-LESS ELECTRIC TRACTION PASSENGER ELEVATORS

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 machine-room-less electric traction passenger elevators.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for temporary use of elevators for construction purposes.
2. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
3. Section 042000 "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
4. Section 055000 "Metal Fabrications" for the following:
   a. Attachment plates and angle brackets for supporting guide-rail brackets.
   b. Hoist beams.
   c. Structural-steel shapes for subsills.
   d. Pit ladders.
   e. Cants made from steel sheet in hoistways.
5. Section 221429 "Sump Pumps" for sump pumps, sumps, and sump covers in elevator pits.
6. Section 271513 "Communications Copper Horizontal Cabling" for twisted pair cable for telephone service for elevators and for connection to elevator controllers for remote monitoring of elevator performance.
7. Section 283111 "Digital, Addressable Fire-Alarm System" for smoke detectors in elevator lobbies to initiate emergency recall operation, for heat detectors in shafts and machine rooms to disconnect power from elevator equipment before or on sprinkler activation, and for connection to elevator controllers.

1.3 DEFINITIONS

A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

B. Service Elevator: A passenger elevator that is also used to carry freight.
1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
   2. 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, coordination with building structure, relationships with other construction, and locations of equipment.
   2. Include large-scale layout of car-control station[ and standby power operation control panel].
   3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples for Initial Selection: For each type of exposed finish 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 and pit layout and dimensions, as indicated on Drawings, and electrical service[ including standby power generator], 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.
   1. Submit manufacturer’s or Installer’s standard operation and maintenance manual, according to ASME A17.1/CSA B44[ including diagnostic and repair information available to manufacturer’s and Installer’s maintenance personnel].

B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard [one-year] [two-year] [five-year] <Insert agreement period> maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.
D. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner with terms, conditions, and obligations as set forth in, and in same form as, a "Draft of Elevator Maintenance Agreement" at end of this Section, starting on date initial maintenance service is concluded.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.9 COORDINATION

A. Coordinate installation of inserts, sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, inserts, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.

B. Coordinate locations and dimensions of work specified in other Sections that relates to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways and pits.

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: <Insert number> year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Otis Elevator Company, Model Gen2or comparable product by one of the following:

1. KONE Inc.
2. Schindler Elevator Corp.
3. ThyssenKrupp Elevator.

B. Source Limitations: Obtain elevators[, including freight elevators specified in other Sections,] from single manufacturer.
   1. Major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.


2.3 ELEVATORS

A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.

B. Elevator Description:

1. Rated Load: 3000 lb.
2. Rated Speed: 150 fpm.
3. Auxiliary Operations:
   a. Battery-powered automatic evacuation.
   b. Earthquake Emergency Operation: Comply with requirements in ASME A17.1/CSA B44.
   c. Automatic dispatching of loaded car.
   d. Nuisance-call cancel.

4. Car Enclosures:
   a. Inside Width: Not less than 80 inches from side wall to side wall.
   b. Inside Depth: Not less than 56-1/2 inches from back wall to front wall (return panels).
   c. Inside Height: Not less than 93 inches to underside of ceiling.
   d. Front Walls (Return Panels): Satin stainless steel, No. 4 finish.
   e. Car Fixtures: Satin stainless steel, No. 4 finish.
   f. Side and Rear Wall Panels: Satin stainless steel, No. 4 finish.
   g. Door Faces (Interior): Satin stainless steel, No. 4 finish.
   h. Door Sills: Aluminum.
   i. Ceiling: Satin stainless steel, No. 4 finish.
   j. Handrails: 1-1/2 inches round, at [sides] [and] [rear] of car.

5. Hoistway Entrances:
   a. Width: 42 inches.
   b. Height: 84 inches.
c. Type: Single-speed side sliding.
d. Frames: Satin stainless steel, No. 4 finish.
e. Doors: Satin stainless steel, No. 4 finish.
f. Sills at First Floor at Basement Floors: Aluminum.

6. Hall Fixtures: Satin stainless steel, No. 4 finish.

7. Additional Requirements:
   a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.

2.4 TRACTION SYSTEMS

A. Elevator Machines: Permanent magnet, variable-voltage, variable-frequency, ac-type hoisting machines and solid-state power converters.
   1. Provide regenerative system.
   2. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
   3. Provide means for absorbing regenerated power when elevator system is operating on standby power.
   4. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.

B. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.

C. Car Frame and Platform: Bolted- or welded-steel units.

D. Guides: Roller guides or polymer-coated, nonlubricated sliding guides. Provide guides at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

A. General: Provide manufacturer’s standard microprocessor operation systems as required to provide type of operation indicated.

B. Group Automatic Operation with Demand-Based Dispatching: Provide[reprogrammable] group automatic system that assigns cars to hall calls based on a dispatching program designed to minimize passenger [wait time] [time to destination]. System automatically adjusts to demand changes for different traffic conditions including heavy incoming, heavy two-way, heavy outgoing, and light off-hours as variations of normal two-way traffic.

C. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. KONE Inc; KCM 831.
      b. Otis Elevator Co; Elevonic.
c. Schindler Elevator Corp; Miconic TX.
d. ThyssenKrupp Elevator; Traflomatic.

D. Auxiliary Operations:

1. Single-Car Standby Power Operation: On activation of standby power, car is returned to a
   designated floor and parked with doors open. Car can be manually put in service on standby
   power, either for return operation or for regular operation, by switches in control panel located
   at main lobby. Manual operation causes automatic operation to cease.
2. Group Battery-Powered Automatic Evacuation: If power fails, cars that are at a floor remain at
   that floor, open their doors, and shut down. Cars that are between floors are moved one at a
   time to the next floor above or below, open their doors, and shut down. System includes
   rechargeable battery and automatic recharging system.
3. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors
   begin closing.
4. Nuisance-Call Cancel: When car calls exceed a preset number while car load is less than a
   predetermined weight, all car calls are canceled. Preset number of calls[ and predetermined
   weight] can be adjusted.
5. Loaded-Car Bypass: When car load exceeds 80 percent of rated capacity, car responds only to car
   calls, not to hall calls.

E. Security features shall not affect emergency firefighters' service.

2.6 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-
   controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams
   shall cause doors to stop and reopen.

B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time,
   through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at
   reduced kinetic energy.

2.7 CAR ENCLOSURES

A. General: Provide enameled or powder-coated steel car enclosures to receive removable wall panels,
   with removable car roof, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by
   ASME A17.1/CSA B44.

B. Materials and Finishes: Manufacturer's standards, but not less than the following:

1. Subfloor: Exterior, C-C Plugged grade plywood, not less than 7/8-inch nominal thickness.
2. Floor Finish: [Specified in Section <Insert Section number>"<Insert Section title>."] [Elevator
   manufacturer's standard level-loop nylon carpet; color as selected by Architect from full range of
   industry colors.]
3. Stainless-Steel Wall Panels: Flush, formed-metal construction; fabricated from stainless-steel
   sheet.
5. Sight Guards: Provide sight guards on car doors.

6. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.

7. Metal Ceiling: Flush panels, with [incandescent downlights in the center of] [four low-voltage downlights in] each panel. Align ceiling panel joints with joints between wall panels.

2.8 HOISTWAY ENTRANCES

A. Hoistway Entrance Assemblies: Manufacturer’s standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.

1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.

B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to [NFPA 252] [or] [UL 10B].

C. Materials and Fabrication: Manufacturer’s standards, but not less than the following:


2. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet by laminating stainless-steel sheet to exposed faces and edges of enameled or powder-coated steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.


4. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.

5. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

2.9 SIGNAL EQUIPMENT

A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Provide [vandal-resistant] buttons and lighted elements illuminated with LEDs.

B. Car-Control Stations: Provide manufacturer’s standard [recessed] [or] [semirecessed] car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.

1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.

2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.

C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

D. Firefighters' Two-Way Telephone Communication Service: Provide [flush-mounted cabinet] [telephone jack] in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in [Section 283111 "Digital, Addressable Fire-Alarm System."] [Section 283112 "Zoned (DC Loop) Fire-Alarm System."]
E. Car Position Indicator: Provide [illuminated, digital-type car position indicator, 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. Include travel direction arrows if not provided in car-control station.

F. Hall Push-Button Stations: [Provide one hall push-button station at each landing] [Provide one hall push-button station at each landing for each single elevator or group of elevators, but not less than one station for each four elevators in a group] [Provide hall push-button stations at each landing as indicated].

1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
2. Equip units with buttons for calling elevator and for indicating desired direction of travel.
3. Provide telephone jack in each unit for firefighters’ two-way telephone communication service specified in

G. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide[ one of] the following:

1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.

H. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.

1. At manufacturer's option, audible signals may be placed on cars.

I. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 FINISH MATERIALS

A. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.

B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

C. Stainless-Steel Bars: ASTM A 276, Type 304.

D. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

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. Examine hoistways, hoistway openings, and pits as constructed; 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. Comply with manufacturer’s written instructions.

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 standards for workmanship and for qualifications of welding operators.

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. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

H. Locate hall signal equipment for elevators as follows unless otherwise indicated:
   1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
   2. Place hall lanterns either above or beside each hoistway entrance.
   3. 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. Operating Test: Load elevator to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.

C. 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: Limit temporary use for construction purposes to one elevator. Comply with the following requirements for elevator used for construction purposes:

1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
2. Provide strippable protective film on entrance and car doors and frames.
3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
5. Do not load elevators beyond their rated weight capacity.
6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate[, adjust, and maintain] elevator(s).
B. Check operation of elevator with Owner's personnel present before date of Substantial Completion[ and again not more than one month before end of warranty period]. Determine that operation systems and devices are functioning properly.

3.6 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include <Insert number> months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance during normal working hours.
2. Perform emergency callback service during normal working hours with response time of two hours or less.
3. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two hours or less.

END OF SECTION 142123.16