

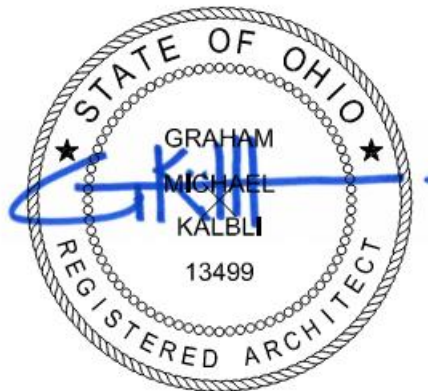


## PROJECT MANUAL

# PARAMOUNT WORKS

2505 Kemper Ln.  
Cincinnati, OH 45206

GRAHAM MICHAEL KALBLI  
LICENSE #13499  
EXPIRATION DATE 12/31/25



**New Republic Architecture**  
1936 Race Street, Suite C101  
Cincinnati, Ohio 45202  
Project. No.: 23-008

Prepared For | **The Model Group**  
1826 Race Street  
Cincinnati, Ohio 45202

**Permit & Pricing Issuance | 26 February 2024**

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SECTION 000101 - PROJECT TITLE PAGE

# PARAMOUNT WORKS

2505 Kemper Ln.  
Cincinnati, OH 45206

Prepared for:

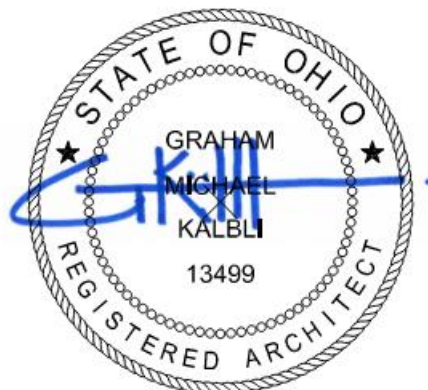
**Model Group**  
1826 Race St.  
Cincinnati, OH 45202

by:

**New Republic Architecture**  
1936 Race Street, Suite C101  
Cincinnati, OH 45202

New Republic Architecture Project No. 23-008  
***Permit & Pricing Issuance – 26 February 2024***

GRAHAM MICHAEL KALBLI  
LICENSE #13499  
EXPIRATION DATE 12/31/25



END OF SECTION 000101

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*General Requirements Subgroup*

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| 018113 | SUSTAINABLE DESIGN REQUIREMENTS ... to be issued via Addendum |

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088000 GLAZING

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089119 FIXED LOUVERS

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092900 GYPSUM BOARD

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095113 ACOUSTIC PANEL CEILINGS

096513 RESILIENT BASE AND ACCESSORIES

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| 096566 | RESILIENT ATHLETIC FLOORING |
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| 102800 | TOILET AND BATH ACCESSORIES      |
| 102819 | TUB AND SHOWER SURROUNDS         |
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| 123530    | RESIDENTIAL CASEWORK           |
| 123661.19 | QUARTZ AGGLOMERATE COUNTERTOPS |

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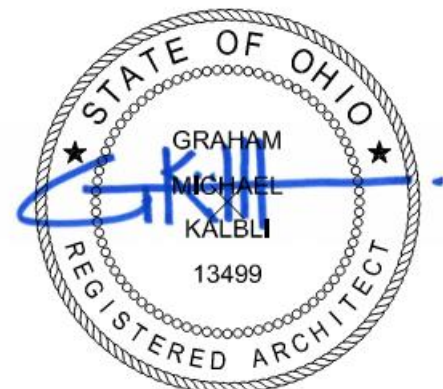
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| 149182 | TRASH CHUTES                |

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GRAHAM MICHAEL KALBLI  
 LICENSE #13499  
 EXPIRATION DATE 12/31/25



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## SECTION 003132 - GEOTECHNICAL DATA

### 1.1 GENERAL REQUIREMENTS

- A. The following pages contain the following:
  - 1. Geotechnical data titled *Paramount Launch Building Geotechnical Report*, dated May 24, 2022, prepared by Consulting Services Incorporated, Project No. CN210109, for the Model Group.
- B. The Owner and Architect do not guarantee that materials other than those disclosed by the test borings will not be encountered or that proportions of the various materials will not vary from those indicated.
- C. It is required that Bidders read and familiarize themselves with the report, *Paramount Launch Building Geotechnical Report*, Project No. CN210109, and visit the site.

END OF SECTION 003132

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# **Paramount Launch Building Geotechnical Report**

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**Prepared for**

**Model Group  
1826 Race Street  
Cincinnati, OH 45202**

**May 24, 2022**

**Project No. CN210109**

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## CONSULTING SERVICES INCORPORATED

Geotechnical & Materials Engineering | IBC Special Inspection | Material Testing

May 24, 2022

Model Group  
1826 Race Street  
Cincinnati, Ohio 45202

Attention: Mr. David Daugherty  
Sent via e-mail: ddaugherty@modelgroup.com

**Subject: Geotechnical Report for  
Paramount Launch Building  
1826 Race Street,  
Cincinnati, Ohio  
CSI Project No. CN210109**

Dear Mr. Daugherty,

**Consulting Services Incorporated of Cincinnati (CSI)** is pleased to present our geotechnical report for the Paramount Launch building in Cincinnati, Ohio. We provided our services in general accordance with the CSI Proposal 7305, dated June 14, 2021.

Our report represents information provided to us, readily available published data relevant to the site and site area, our observations and subsurface conditions encountered and our opinion of primary geotechnical conditions (discussion and recommendations) affecting site work and foundation design for the project.

Again, we greatly appreciate the opportunity to provide our services and look forward to working with you and the project team on this (and hopefully) more projects in the future. Please do not hesitate to contact us for questions or comments about the information contained herein.

Cordially,

Graham T. Duncan, EIT  
Staff Engineer

Joseph S. Burkhardt, PE  
Principal Geotechnical Engineer





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## INTRODUCTION

### 1 SCOPE OF THE GEOTECHNICAL EXPLORATION

As proposed, CSI conducted a geotechnical exploration for several proposed buildings and parking areas associated with the development at 2520 Gilbert Avenue in Cincinnati, Ohio. Our services included a review of the project information provided, conducting a subsurface exploration that utilized soil borings to obtain samples for modeling the soil conditions at the proposed development, an analysis of data and information obtained, providing foundation recommendations for the site conditions and providing recommendations for site earth work.

As part of our evaluation of the site, 14 borings total borings and 6 test pits were performed. A preliminary geotechnical report was prepared for the property on July 23, 2021 that addressed a proposed building in the western portion of the site along with providing general site conditions. For the purposes of the report, borings B-6, B-7, B-8, B-9, B-10, B-11, and B-12 along with TP-1 thru TP-6 were evaluated for the proposed 5-story Paramount Launch building along East McMillan Street.

### 2 SITE AND PROJECT INFORMATION

In preparing for this report, CSI was provided with a site plan titled 'Feasibility Study', dated April 5, 2022 as well as architectural plans titled 'Building A' dated April 29, 2022. A summary of the site and project information is summarized in Tables 1 and 2 below.

**Table 1: Site Information**

| Item                            | Description                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site Location                   | The site is located on 2520 Gilbert Avenue in Cincinnati, Ohio                                                                                                                                                                                                |
| Size of Site                    | Total site area is approximately 3.5 acres, however about 2.5 acres will be developed as part of the Paramount Launch Mixed Use Building.                                                                                                                     |
| Surrounding Area                | The surrounding area is characterized by residential and commercial developments in all directions                                                                                                                                                            |
| Existing Conditions             | The site is relatively flat and asphalt paved. Sand backfill is present at the ground surface within the majority of the previous Kroger store.                                                                                                               |
| Existing/Previous Structures(s) | The site was most recently occupied by a Kroger shopping center located near the south eastern property corner which was recently demolished. Prior to the Kroger, several other buildings were present on the site dating back to at least the early 1900's. |
| Existing/Previous Utilities     | Existing utilities associated with the previous development were present including electric, storm, and sewer lines.                                                                                                                                          |

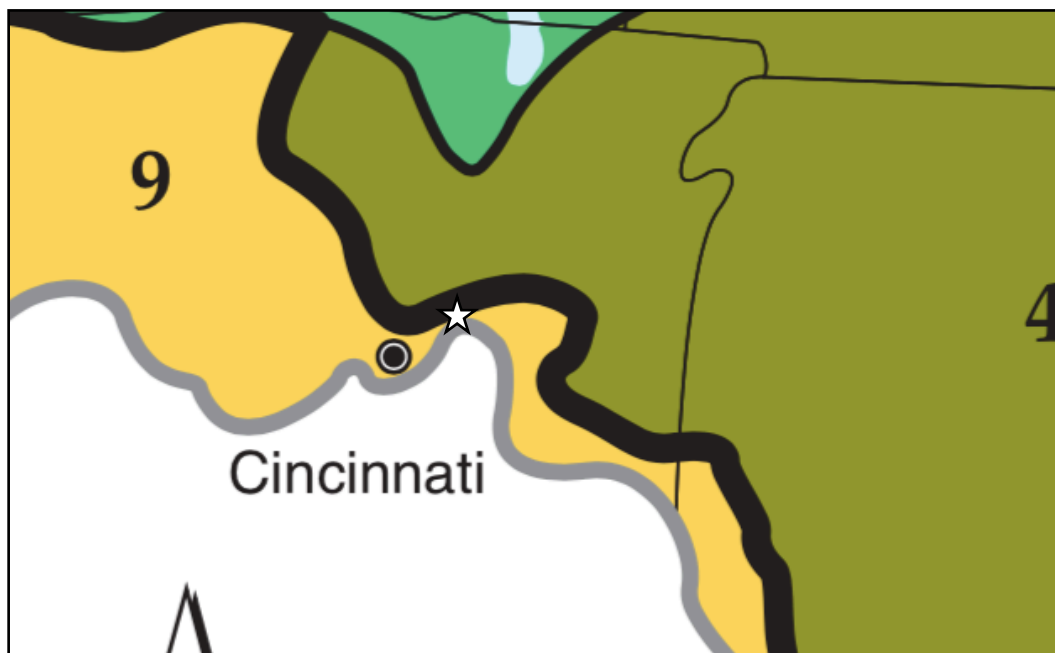
**Table 2: Project Information**

| Item                     | Description                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site Layout and Grading  | See boring location plan in Appendix for details                                                                                                                                            |
| Proposed Structure(s)    | The proposed building (building A) will be a five story mixed use development with commercial spaces located on the lower level and residential units on the upper floors.                  |
| Building Construction    | Slab-on-grade and wood framed (assumed)                                                                                                                                                     |
| Grading                  | Grading plans have not been provided however due to the relatively flat nature of the site, cut and fills of about 5 feet or less have been assumed.                                        |
| Finished Floor Elevation | Provided plans indicate the building will have finished floor elevations that range from 828.5 to 832 feet.                                                                                 |
| Maximum Loads            | Interior Columns: 440 kips<br>Exterior Columns: 220 kips<br>Corner Columns: 115 kips<br>Continuous loads: 3 kips per linear foot or less (assumed)<br>Floor Slab: 100 psf or less (assumed) |

### 3 AREA/SITE INFORMATION

#### 3A AREA TOPOGRAPHY / PHYSIOGRAPHY

The site is located on the border between two physiographic regions. Within the Outer Bluegrass Region, the area is characterized by Ordovician and Silurian-age dolomites, limestones, and calcareous shales; thin pre-Wisconsinan drift on ridges in west; silt-loam colluvium. The Illinoian Till Plain is characterized by a rolling ground moraine of older till. Elevations in the area range from about 838 feet along the northern property line to about 828 feet along the eastern property line. Below is a figure of the location of the site with respect to the regional physiography.

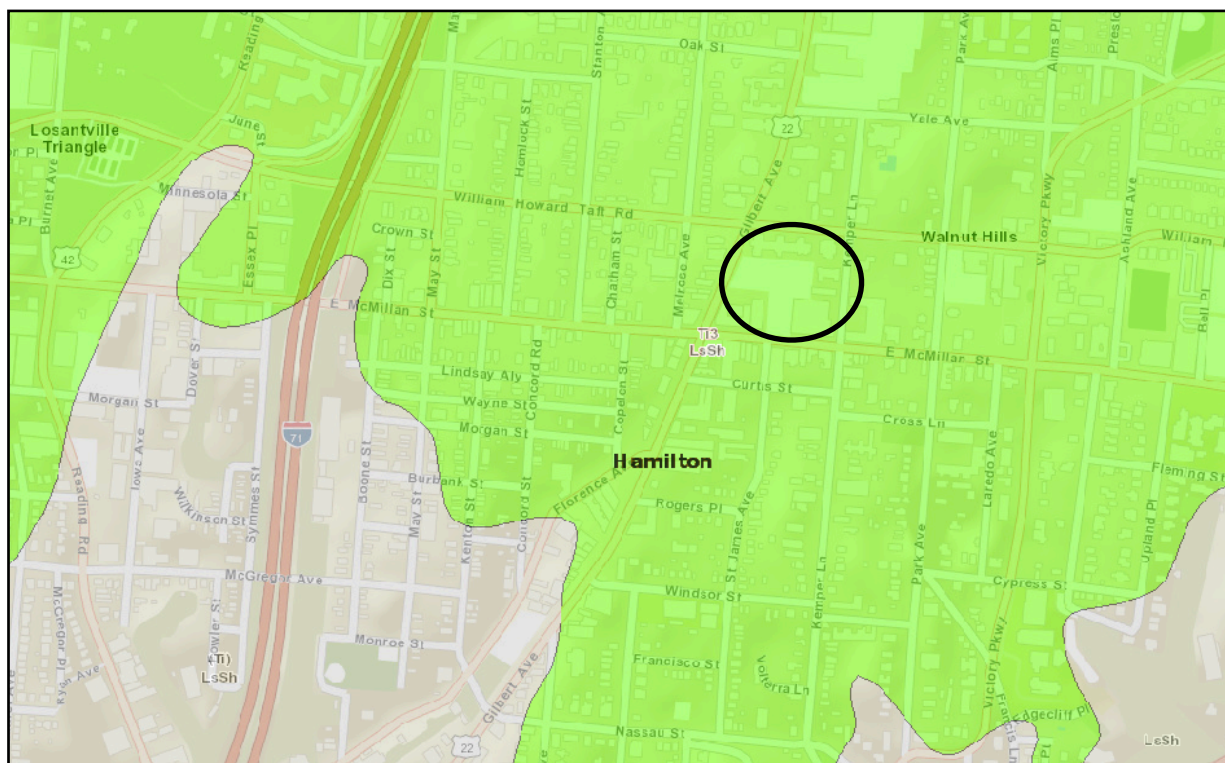


**Figure 1:** Ohio Physiographic Map (site vicinity shown with star)

### 3B SITE GEOLOGY

Published surficial geology maps shown in Figure 2 below, indicate that the soils at the site are comprised of Illinoian-Age loamy till (Ti) which generally consists of clay with varying amounts of silt, sand, and rounded gravel overlying limestone dominate shale at a depths of up to 30 feet below grade. Glacial till depths in neighboring areas to the south, east, and west of the site are shown to be 10 feet or less.

A review of the *Bedrock Geology of the Covington Quadrangle*, dated January 10, 1996, indicated the project site is underlain with bedrock belonging to the Grant Lake formation. The Grant Lake formation consists of interbedded limestone (50%) and shale (50%). In general, the limestone and shale within this formation is gray to bluish gray, weathering to a light gray with planar to lenticular bedding.



**Figure 2:** Ohio Surficial Geology (site vicinity shown outlined)

### 3C PUBLISHED SITE SOIL CONDITIONS

Review of the USDA Soil Survey of Hamilton County (NRCS website), the soils underlying the proposed site consist of the Urban Land (Ur) soil series. These soils are typically associated with man made fills or otherwise developed land, which is typical in developed areas of Cincinnati. The Urban land accounts for 100% of the area. While the properties of these soil series may vary greatly depending on many factors, such as previous site use, these soils generally have a depth to water table and depth to restrictive features of greater than 80 inches.



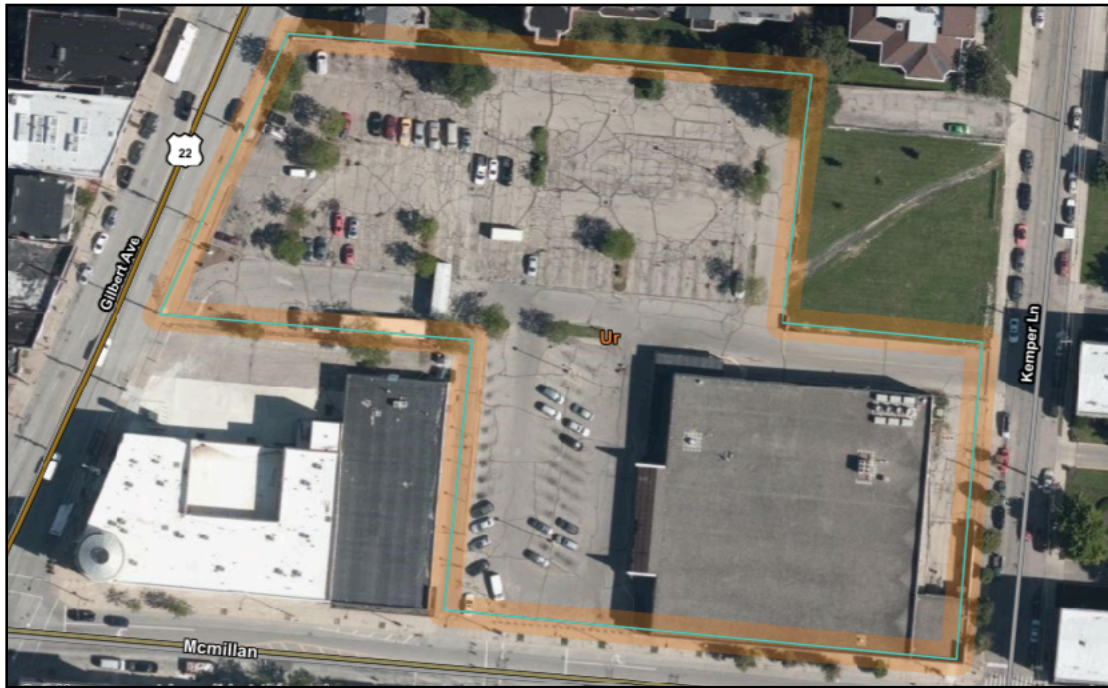


Figure 3: USDA Soil Survey Map of Project Site

### 3D AERIAL PHOTOGRAPHS (GOOGLE EARTH)

Review of historical aerial photography, Figures 4 and 5 below, indicate the site has remained relatively unchanged with the demolition of a building (outside of property lines for this development) to the north of the existing Kroger building occurring at some point between 2011 and 2012. The former Kroger building located near the south eastern property corner was demolished prior to our test pits which were performed on April 11, 2022.



Figure 4: Google Earth - Dated: 4/9/93



Figure 5: Google Earth - Dated: 10/7/20



### 3E HISTORICAL MAPPING

In review of published Sanborn Fire Maps dated 1904, the site was previously occupied by a former hotel, garage, and funeral home as well as several other unmarked buildings. Each of the buildings shown in the Sanborn mapping appear to have been demolished prior to earliest available aerial images. Construction of the now demolished Kroger building also appears to have been completed prior to earliest available images.



Figure 6: Historical Sanborn Mapping (Approximate Location Outlined)

### 4 SITE PHOTOS



Photo 1: View of utilities left in place within Kroger Building



Photo 2: View of construction debris present in test pits





Photo 1: View of ground water intrusion and construction debris



Photo 2: View of groundwater entering test pit from pipe left in place

## FINDINGS

### 5 SUBSURFACE CONDITIONS

CSI performed a total of 14 borings and six test pits to explore the subsurface conditions within the proposed developments. As noted above, the borings and test pits closest to this development are associated with B-6, B-7, B-8, B-9, B-10, B-11, and B-12 along with TP-1 thru TP-6. In general our borings/test pits encountered fill overlying glacial and residual soils.

#### 5A STRATA INFORMATION

The subsurface conditions encountered at the test boring and test pit location is shown in the Test Boring/Test Pit Logs in the Appendix. This record represents our interpretation of the subsurface conditions based on the field log, visual examination of field samples by an engineer, and tests of the samples collected. The letters in parentheses following the soil descriptions are the soil classifications in general accordance with the Unified Soil Classification System (USCS). It should be noted that dashed stratification lines shown on the soil boring log represent approximate transitions between material types. In-situ stratum changes could occur gradually or at slightly different depths. Boring elevations were interpolated based upon published GIS data.

#### SURFICIAL COVER

Asphalt was encountered at the ground surface within each of the boring locations and was measured to be between 7 and 18 inches thick. Gravel base was encountered underlying the asphalt in borings B-6 and B-7 and was measured to 4 and 3 inches thick respectively.

## **FILL**

Previously placed fill material was encountered in each boring and test pit to depths ranging from about 3 to 8 feet below grade. In general, the fill was encountered in two distinct layers. Within borings B-6, B-7, and B-10 the fill was described to be brown to gray lean clay with varying amounts of silt, sand, brick/asphalt fragments, and rock fragments. Within test pits TP-1 thru TP-6 as well as borings B-8, B-9, B-11, and B-12 the fill was described to be brown sand with varying amounts of round gravel, rock fragments, and brick fragments. Standard Penetration Testing (SPT) N-Values within cohesive samples were reported to range from 2 to more than 50 blows per foot (bpf) indicating a soft to hard consistency however was generally noted to be less than 10 bpf. N-values within non-cohesive samples was noted to be between 11 and 31 bpf indicating a firm to dense relative density. Laboratory testing on representative samples indicate natural moisture contents ranged from 4.0 to 27.5 percent.

## **GLACIAL TILL**

Glacial soils were encountered underlying the surficial cover or fill (where present) in borings B-6, B-7, B-8, and B-9 as well as test pits TP-1, TP-3, TP-4, TP-5, and TP-6. In general the glacial soils were described to be brown to brown and gray mottled lean clay with varying amounts of silt, sand, and rounded gravel. SPT N-values ranged from 2 to 19 blows per foot indicated a soft to very stiff consistency. Laboratory testing indicates Liquid Limits (LL) ranging from 28 to 46 percent with Plasticity Indices (PI) ranging from 11 to 27 percent. Natural moisture contents ranged from 18.3 to 49.5 percent.

## **LACUSTRINE**

What appeared to be lacustrine soil deposits were observed in boring B-8 at a depth of about 17 feet below grade. The Lacustrine soils were described to be brown to brown and gray mottled lean to fat clay with varying amounts of silt and sand. SPT N-values of 9 and 16 blows per foot were recorded indicating a stiff to very stiff consistency.

## **RESIDUUM**

Residual Soils were encountered underlying the surficial cover or fill/glacial till (where present) in borings B-7, B-9, B-10, and B-11. In general the residual soils were described to be brown lean to fat clay with varying amounts of silt, sand, and rock fragments. SPT N-values ranged from 4 to more than 50 blows per foot indicated a soft to hard consistency. Laboratory testing indicates a Liquid Limit (LL) of 62 percent with a Plasticity Index (PI) of 34 percent. Natural moisture contents ranged from 23.5 to 42.0 percent.

## **HIGHLY WEATHERED SHALE AND LIMESTONE BEDROCK**

Auger refusal on what is assumed to be bedrock was encountered at each borings borings B-6, B-8, and B-9 at depths ranging from 10.5 to 23.8 feet.

For details of subsurface conditions encountered at a particular boring location please refer to the boring logs contained in Appendix A. It should be noted that our borings were drilled and sampled according to the procedures presented in the appendix. The boring locations shown in the appendix should be considered accurate only to the degree implied by the method used.

## **5B GROUNDWATER CONDITIONS**

Groundwater was noted on drilling tools within boring B-14 at a depth of about 3.5 feet below grade during drilling. Additionally, groundwater was encountered within test pits TP-4 and TP-6 at depths of about 1.5 and 4 feet below grade respectively. The ground water within test pit TP-6 was observed to enter the excavation through a pipe which appeared to have been left in place after demolition of the previous Kroger building. Upon completion of borings groundwater was remeasured, however was not encountered in measurable quantities within any of our boring locations. In many areas of Greater Cincinnati with similar geology, water conditions that can affect construction and performance of projects is often related to trapped/perched water zones, which can be erratic, but often observed in granular soils. Perched water sources are typically not linked to the more continuous relatively stable ground water table that typically occurs at greater depths. In addition to perched water surfaces, groundwater may also be encountered at the soil/bedrock interface. Site excavation activities or ground disturbance can expose these features and the resulting seepage can vary greatly. Groundwater issues are also dependent upon recent rainfall activity and surface and subsurface drainage patterns in the area that may change depending on climatic conditions.

## **6 LABORATORY TESTING**

Laboratory tests were performed on selected recovered samples from the borings to provide recommendations for earthwork and to determine index properties of the soils. Details for the test methods and results are shown in the Appendix. Tests performed included:

- 41 Moisture Content Tests
- 8 Grain Size Analyses (-200 Sieve)
- 8 Atterberg Limits Tests

## **GEOTECHNICAL DISCUSSION AND RECOMMENDATIONS**

### **7 DISCUSSION—GEOTECHNICAL ISSUES**

Based on our experience with similar projects and the conditions observed during our subsurface exploration, we believe the site is suitable for the proposed construction, provided the recommendations outlined in this report are followed. The primary geotechnical concerns are:

- **EXISTING DEVELOPMENT & PREVIOUSLY PLACED FILL**
- **SOFT SOILS**

#### **7A UNDOCUMENTED FILL MATERIALS AND PREVIOUS DEVELOPMENT**

As noted above, the property has seen extensive multi-generational development and most recently, the Kroger building was razed. Based upon experience with similar developments in the area was common to backfill basement excavations with brick, sand, concrete, old foundations, and other miscellaneous debris often resulting in minimal compaction and void space within the fill mass. In addition, old foundations, walls, and floor slabs were often left in place. Constructing over these elements does present a risk with total settlement and differential support conditions resulting in unpredictable behavior of the structure.

Additionally, undocumented fill material was encountered in several borings and test pits to a depth of up to 8 feet. Based on our experience along with encountering brick and other debris, the fill was likely placed with minimal comparative effort and are considered poor bearing materials and can have unstable sidewalls during excavations. Constructing over these soils presents a risk with both total and differential settlement of the structure. The risk associated with constructing the proposed site improvements over the old fill cannot be eliminated unless all of the old fill is removed and replaced with new structural fill or in the case of foundations, they penetrate the fill to an appropriate bearing stratum to provide the necessary bearing capacity. If the owner is willing to assume the risk of leaving some of the undocumented fill in place, there has been success with numerous structures where a partial undercut is performed. Further discussion and recommendations of floor slabs and pavements on the undocumented fill are discussed below.

#### **7B SOFT SOILS**

Relatively soft soils were observed within the glacial and residual soils underlying the fill material in some of the borings. These soils are prone to bearing capacity failures and settlement, both total and differential. With the structural loads of the building and anticipated foundation sizes, the influence of these loads will extend into the zone of soft conditions. To remediate this, foundations would either need to penetrate the soft soils or ground modification using aggregate piers would need to be performed.

### **8 EARTHWORK**

Historically, more change orders (in orders and costs) occur during the earthwork portion of construction than in almost any other part of the project. Further, the site preparation phase of construction always affects the future performance of project structures and pavements. Add into this, the fact that earthwork is the portion of work most influenced by wet weather and unknown conditions and time-wise, this section of the report could be the most important to prevent and minimize delays and costs during construction and for the life of the project.

Please review the geotechnical concerns listed in Section 7 prior to reading the following recommendations. If problems occur and the recommendations do not address or do not adequately remedy, please contact CSI as soon as possible.

## **8A EXCAVATIONS**

Normal earth excavation equipment should be suitable for excavation operations that are associated with the overburden soils. All excavations should comply with OSHA requirements. For below-grade excavations, the fill soils should be classified as an OSHA Type C soil with slope excavations of 1.5H:1V. The glacial and residual clay soils should be classified as an OSHA Type B soil with slope excavations of 1H:1V. Shallower excavation slopes are expected to be required in areas where sand is encountered, particularly within the previous Kroger building footprint. If soil types other than what has been mentioned above are encountered, CSI should be contacted to evaluate stability.

## **8B SITE PREPARATION (WORK PRIOR TO FILLING)**

- The area should be stripped of any topsoil and/or vegetative cover prior to commencing fill operations;
- Areas ready to receive new fill should be proofrolled with a heavily loaded dump truck or similar equipment judged acceptable by the geotechnical engineer.;
- The level of proofroll should be determined by the geotechnical engineer on a case-by-case basis;
- Perform the proofrolling after a suitable period of dry weather to avoid degrading the subgrade;
- Areas which pump, rut, or wave during proofrolling may require undercutting and recompaction;
- Backfill of undercut areas should be done in accordance with section 8C;
- Deleterious materials such as topsoil, roots, wood or other materials that will decay should be removed from the site;
- Retain CSI to observe the proofrolling/subgrade evaluation and make recommendations for any unstable or unsuitable conditions encountered - this can save time on the construction schedule and save unnecessary undercutting;
- We recommend that site grading should take place between about late April to early November. Earthwork taking place outside this time period will likely encounter wet conditions and weather conditions that will provide little to no assistance with drying the soils.

## **8C NEW FILL OPERATIONS (MASS EARTHWORK)**

Before new fill construction, representative samples should be obtained of the proposed fill material to determine the moisture-density, classification of the material, and whether the material is suitable to be used as structural fill. After the subgrade has been approved to receive new fill, the fill may commence with the following procedures and guidelines recommended:

- Place cohesive fill (clay) in maximum 8-inch thick loose lifts. Granular soils may be placed in maximum 12 inch loose lifts provided properly sized equipment is used in the compaction process;
- Fill lifts should be compacted to at least 98 percent of the soil's maximum dry density (ASTM D698) in areas beneath structures (buildings, equipment foundations and pavements);
- Non-structural areas (i.e. grassed and/or landscape areas) can utilize a lower compaction requirement of 90 percent. Non-structural areas should be considered 5 feet beyond the limits of structural entities (i.e. building, pavements, sidewalks, etc);
- Maintain the moisture content of compacted fill between minus 2 and plus 2 percent of optimum moisture;
- Maximum particle size of the soil should be limited to half the lift thickness. Equipment should be large enough that any large particles are thoroughly broken up. Large pieces not able to be satisfactorily broken up should be removed from the fill. Excessive construction debris should also be removed;
- Density testing should be performed as a means to verify percent compaction and moisture content of the material as it is being placed and compacted;
- Observation of fill "stability" is also critical, so it is recommended to observe the operation of the filling equipment traversing over the new fill to document movement (similar to proof rolling);
- Density testing should be performed at a rate of at least one per 10,000 square feet per lift with a minimum of 3 tests per lift;
- Soils should not be "over compacted" and construction traffic should be kept to minimum to assure compaction is achieved and that the soil is not allowed to "break down"; and
- Retain a representative of CSI to observe and document fill placement and compaction operations.

## **8D GENERAL NOTES**

- For all earthwork operations, positive surface drainage is prudent to keep water from ponding on the surface and to assist in maintaining surface stability;

- The surface should be sealed prior to expected wet weather. This can usually be accomplished with rubber-tired construction equipment or a steel-drum roller;
- If any soil placement problems occur, CSI should be retained to provide additional recommendations, as needed.

## **9 SITE DRAINAGE**

During construction, water should not be allowed to pond in excavations and fill areas or undercutting will likely be required. During the life of the project, slope the subgrade and other site features so that surface water flows away from the site structures.

For excavations during construction, most free water from the subsurface conditions could likely be removed via sump pumps and open channel flow (if possible) at or near the source of seepage. However, if normal dewatering measures prove insufficient, CSI should be retained to provide recommendations on the issue.

## **10 FOUNDATIONS**

Based on the soft soils, undocumented fill and structural loads, foundations would either need to penetrate the fill or ground modification of the foundations by using aggregate piers needs to be performed. Based upon our discussion, it is our opinion that the most economical foundation support system would be ground modification using aggregate piers. The aggregate piers will allow for the use of a higher bearing pressure when compared to support on typical soils along with allowing the use of conventional spread footings. Alternative foundations would be to utilize drilled or helical piers with a grade beam system.

### **10A AGGREGATE PIERS (GEOPIERS)**

Geopier aggregate pier elements are a propriety technique whereby crushed stone is placed in lifts by either drilling or vibratory methods. Each of the lifts is then compacted, resulting in a pre-stressing of the existing soil around the “piers” and a partial transfer of foundation loads to a deeper, more competent stratum effectively reducing foundation settlement. After the “in-place” modification, spread footings can be used with a relatively high design bearing pressure without undercutting unsuitable soils.

Based upon our experience, the footings that bear on “improved” subgrade soils that are prepared as described above can probably be designed for net allowable soil pressures on the order of 5,000 psf; however, we suggest contacting Geopier for a formal design. Because the “Geopier” soil modification system is a proprietary procedure that is designed by a registered engineer with Geopier, and installed by a specialty contractor, CSI should be retained to coordinate efforts with Geopier to arrive at the most economical and effective actual design.



## **10B GENERAL FOUNDATION RECOMMENDATIONS**

Detailed settlement analysis was beyond the scope of this exploration. However, based on the estimated structure loads, the anticipated behavior of soil types encountered during field activities, and our experience with similar projects, we expect that total settlements will not exceed 1 inch, and that differential settlements will not exceed  $\frac{3}{4}$  inch between columns or along continuous footing distances of 25 feet. We recommend the structures be designed to accommodate this magnitude of total and differential settlement.

Settlement estimates are based, in part, upon the assumption that site preparation is performed in accordance with our recommendations and with good quality control of the earthworks.

Additional design considerations for project foundations are outlined as follows:

- Design all footings with a minimum 18 inches width;
- All exterior footing bottoms should bear at least 30 inches below finished exterior grading for frost protection.
- Interior footings (those not exposed to freezing) may be placed at nominal depths provided they bear on suitable material as recommended in this report;
- Include control joints at suitable intervals in the walls of structures and in areas where changes in support from native soil to fill are anticipated, to help accommodate differential foundation movements.

## **10C SHALLOW FOUNDATIONS-CONSTRUCTION NOTES**

In general, soils tend to lose strength if they become wet. We recommend the foundation subgrades be protected from exposure to water. For foundations construction, we also recommend the following procedures.

- For soils that will remain exposed overnight or for an extended period of time, place a "lean" concrete mudmat (1 to 2 inches) over the bearing areas. Flowable fill concrete or low-strength concrete is suitable for this cover, as conditions allow;
- Foundation bearing conditions should be benched level.
- Areas loosened by excavation operations should be recompact prior to reinforcing steel placement.
- Loose soil, debris, and excess surface water should be removed from the bearing surface prior to concrete placement.
- Retain the geotechnical engineer to observe all foundation excavations and provide recommendations for treatment of any unsuitable conditions encountered.
- The bearing conditions should be checked by means of portable dynamic cone penetration (DCP) testing at the direction of the geotechnical engineer.

- Even though fill soils placed for foundation support have likely been checked for compaction at the time of placement, these soils may have become wet or lost some level of strength since that time. The areas should be hand probed to check for surface hardness/strength.

## 11 GRADE SUPPORTED FLOOR SLABS

Given the fill material encountered and the apparent lack of engineering controls, constructing a grade-supported slab over the existing fill could result in excessive settlement over time. As indicated above, if the owner is willing to accept the risk of performing a partial undercut, it's our opinion that suitable bearing conditions for the slab can be achieved; however, there is still a risk with leaving the undocumented fill in place. If this is to be performed, we recommend that a minimum of 2 feet of engineered fill be maintained beneath the grade-supported slab. In addition, prior to new fill or after undercuts, the subgrade should pass a proofroll using a loaded tandem axle dump truck loaded with a minimum of 20 tons. Any areas failing the proofroll should be excavated and stabilized in accordance with the geotechnical engineer's recommendations.

We recommend a minimum of 4 inches of compacted granular base beneath the slab. The slab should be designed to be structurally independent of any building footings or walls and should be appropriately reinforced to support the proposed loads and control settlement. For design of the slab, a modulus of subgrade reaction (k) of 100 psi/in may be used.

- Provide isolation joints between the slab and columns and along footing supported walls.
- Adequate joint patterns (ACI and ICC guidelines) should be used to permit slab movement due to normal soil settlement, normal subgrade disturbance and material expansion/contraction.
- Keep the crushed stone or gravel moist, but not wet, immediately prior to slab concrete placement to minimize curling of the slab due to differential curing conditions between the top and bottom of the slab.
- DO NOT allow soils directly below the slab to become overly wet or dry prior to placement of concrete; and
- Retain CSI to review the actual subgrade conditions prior to slab construction and make recommendations for any unsuitable conditions encountered.

**Note: Slab subgrade conditions are also considered earthwork areas and the recommendations contained in the Earthwork section of the report should be followed**

## 12 PAVEMENT SUBGRADE

It is our understanding the the project will also include construction of a passenger vehicle parking lot that we anticipate will be relatively lightly loaded. Similar to grade supported slab sections, pavement areas constructed directly over the fill material could result in pavement

distress over time. While complete removal of the fill material beneath pavement sections is likely not feasible, it has been our experience that performing a partial undercut and/or maintaining a minimum of 2 feet of engineered fill beneath pavements in lieu of a full depth replacement can provide satisfactory performance; however, the owner must be willing to accept the risk of leaving some of the undocumented fill material in place. After undercutting and prior to fill placement the sub grade area should be proofrolled. Any failing areas may require additional undercuts and/or stabilization through the use of geogrid reinforcement. Based upon our borings, we believe that some of the surficial soils may be reused as engineered fill, however it should be anticipated that some of the large construction debris and/or deleterious material will require removal.

Adequate drainage and slope of the pavement subgrade and pavement section should be provided to promote adequate drainage. Edges of the pavement should be provided a means of water outlet by extending the aggregate base course through to side ditches or providing drain pipes and weep holes at catch basin walls. We recommend under-drains be considered at low points of the pavement to facilitate drainage.

### 13 SEISMIC DESIGN

The table below provides seismic design parameters for the site in accordance with the 2012/2015 International Building Code (IBC) and the United States Geological Survey (USGS). These parameters have been based upon a Seismic Site Class of a D. Based upon the building use, we have presumed Seismic Risk Category of III or less for the purpose of seismic design.

**Table 3: Seismic Design Parameters**

| Parameter                               | Value  | 2012/2015 IBC Reference                 |
|-----------------------------------------|--------|-----------------------------------------|
| Soil Profile Site Class                 | D      | Section 1613.3.2 Site Class Definitions |
| 0.2 Second Spectral Acceleration, $S_s$ | 0.144g | Figure 1613.3.1(1)                      |
| 1.0 Second Spectral Acceleration, $S_1$ | 0.078g | Figure 1613.3.1(2)                      |
| Site Coefficient, $F_a$                 | 1.6    | Table 1613.3.3(1)                       |
| Site Coefficient, $F_v$                 | 2.4    | Table 1613.3.3(2)                       |

Based upon the depths to bedrock, its our opinion that the site is borderline between a Site Class C and D. If a Site Class C would allow for reduced bracing and other structural components, ultimately reducing the construction costs, it may be beneficial to perform a site specific geophysical study to determine the actual shear wave velocity of the soils/bedrock.

### 14 NOTES ON THE REPORT AND RECOMMENDATIONS

We recommend that this complete report be provided to the various design team members, the contractors and the project Owner. Potential contractors should be informed of this report in the

"Instructions to Bidders" section of the bid documents. A geotechnical exploration, such as the one we performed, used one boring to attempt to model the subsurface conditions at the site. Because no exploration contains complete data or a complete model, there is always a possibility that conditions between borings will be different from those at specific boring locations. Thus, it is possible that some subsurface conditions will not be as anticipated by the project team or contractor. If this report is included or referenced in the actual contract documents, it shall be explicitly understood that this report is for informational purposes only. CSI shall not be responsible for the opinions of, or conclusions drawn by others.

It has been our experience that the construction process often disturbs soil conditions and this process, no matter how much experience we use to anticipate construction methodology, is not completely predictable. Therefore, changes or modifications to our recommendations are likely needed due to these possible variances. Experienced CSI geotechnical personnel should be used to observe and document the construction procedures and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created. We recommend that the Owner retain CSI to provide this service based upon our familiarity with the project, the subsurface conditions and the intent of our recommendations.

This report is based on the supplied project information, the subsurface conditions observed at the time of the report, and our experience with similar conditions. As such, it cannot be applied to other project sites, types, or combinations thereof. If the Project Information section in this report contains incorrect information or if additional information is available, you should convey the correct or additional information to us and retain us to review our recommendations. Our recommendations may then require modification.

No section or portion of this report (including Appendix information) can be used as a stand alone article to make distinct changes or assumptions. The entire report and Appendix should be used together as one resource. We wish to remind you that our exploration services include storing the soil samples collected and making them available for inspection for 30 days. The soil samples are then discarded unless you request otherwise. Please inform us if you wish to keep any of the obtained samples.

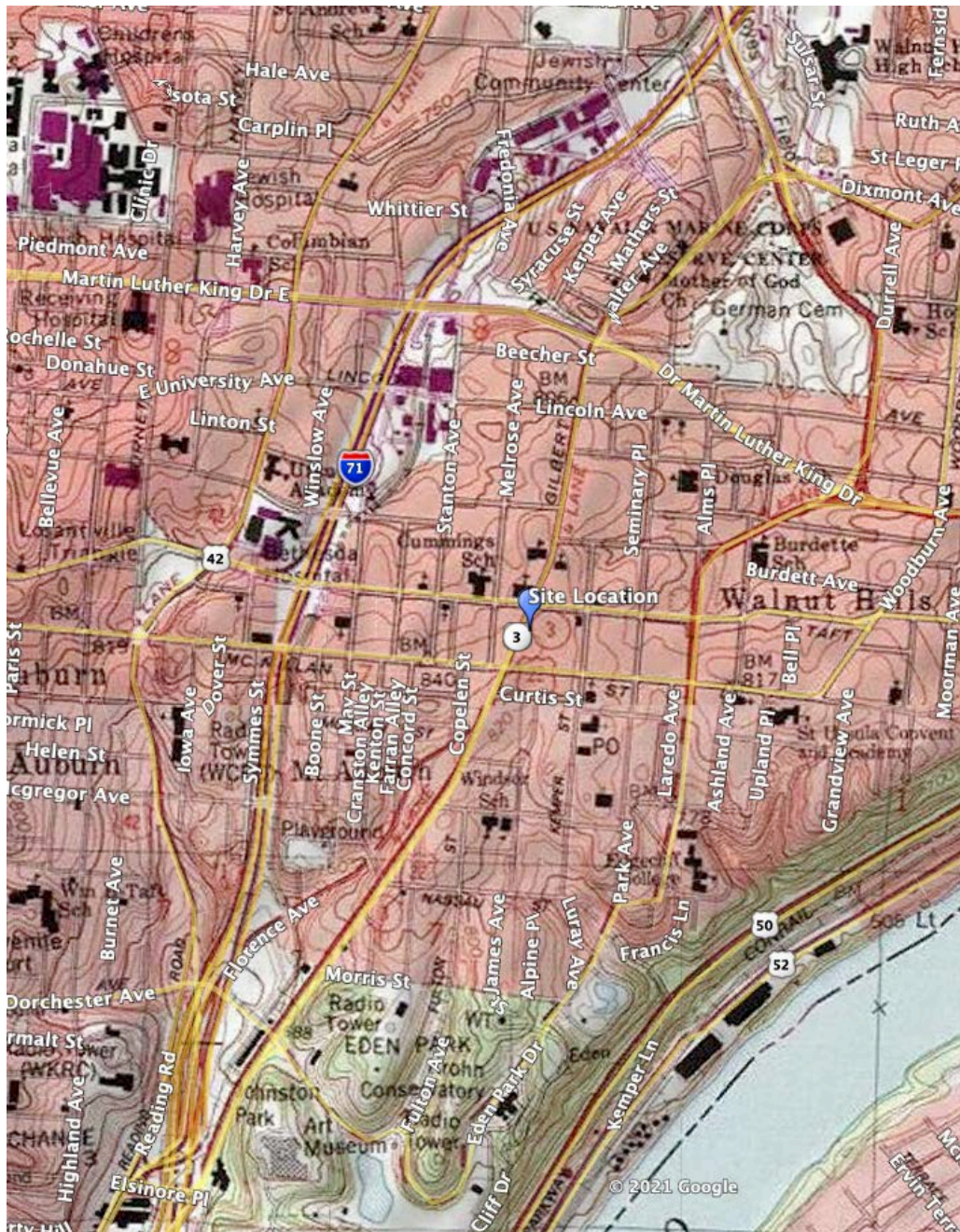
While this report deals with samples of subsurface materials and some comments on water conditions at the site, no assessment of site environmental conditions or the presence of contaminants were performed.

We wish to remind you that our exploration services include storing the soil samples collected and making them available for inspection for 30 days. The samples are then discarded unless you request otherwise. Please inform us if you wish to keep any of the obtained samples.

## **APPENDIX**

**SITE LOCATION PLAN  
TEST PIT & BORING LOCATION PLAN  
GENERAL BORING PROFILE  
GEOTECHNICAL TEST PIT & BORING INFORMATION SHEET  
TEST PIT & BORING LOG  
SUMMARY OF LABORATORY RESULTS  
FIELD TESTING PROCEDURES**





Adapted from Topographic Mapping

FOR ILLUSTRATION PURPOSES ONLY



CSI Cincinnati, LLC  
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TITLE: SITE LOCATION PLAN

PROJECT: Paramount Launch  
Building  
Cincinnati, OH

Project No:  
CN210109

Date:  
7/22/21

Scale: Not To Scale

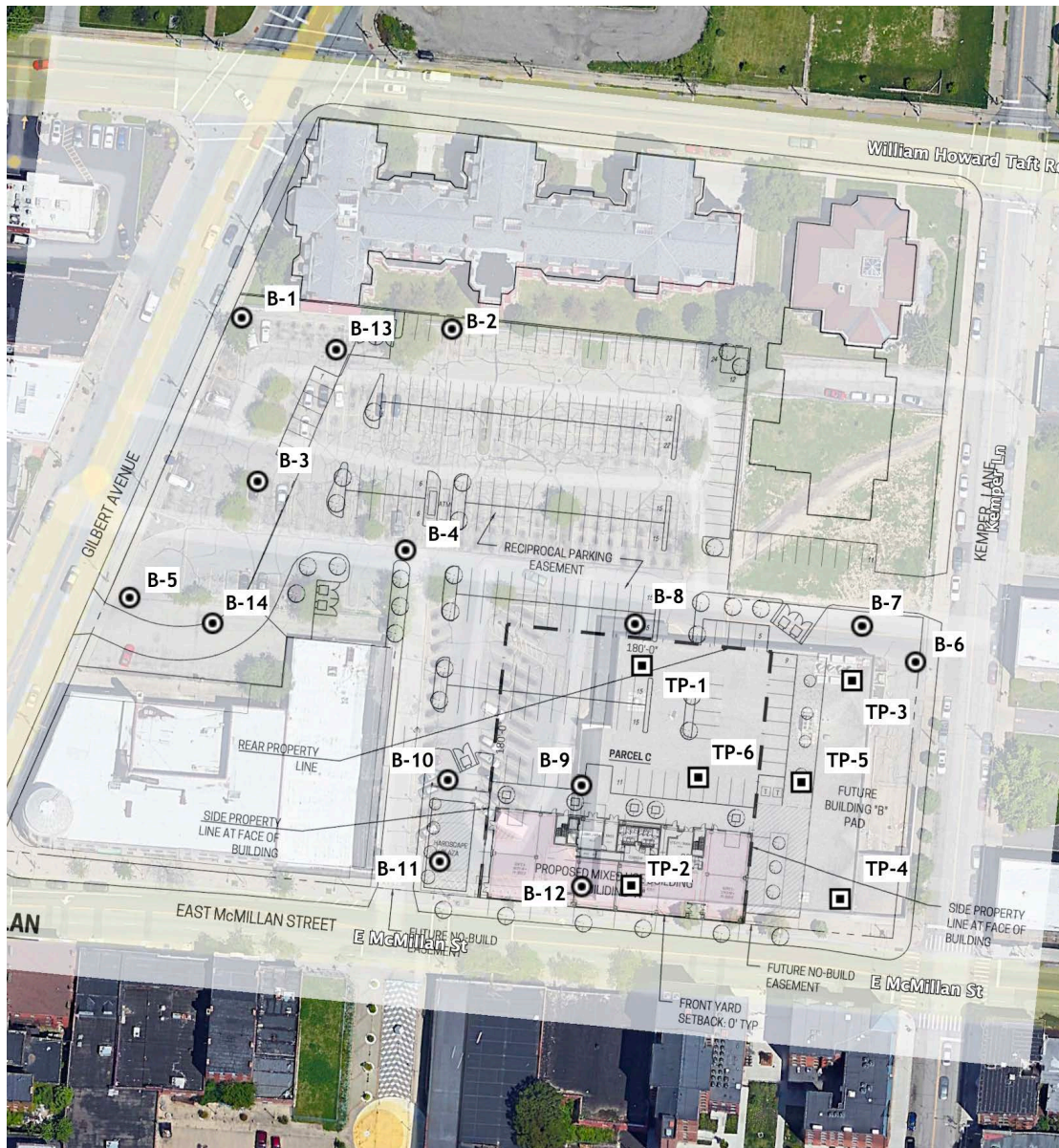
Drawn By:  
GD

Checked By:  
JB

Drawing No:  
1 of 2

This drawing is being furnished for this specific project only. Any party accepting this document does so in confidence and agrees that it shall not be duplicated in whole or in part, nor disclosed to others without the consent of Consulting Services Incorporated of Ohio.





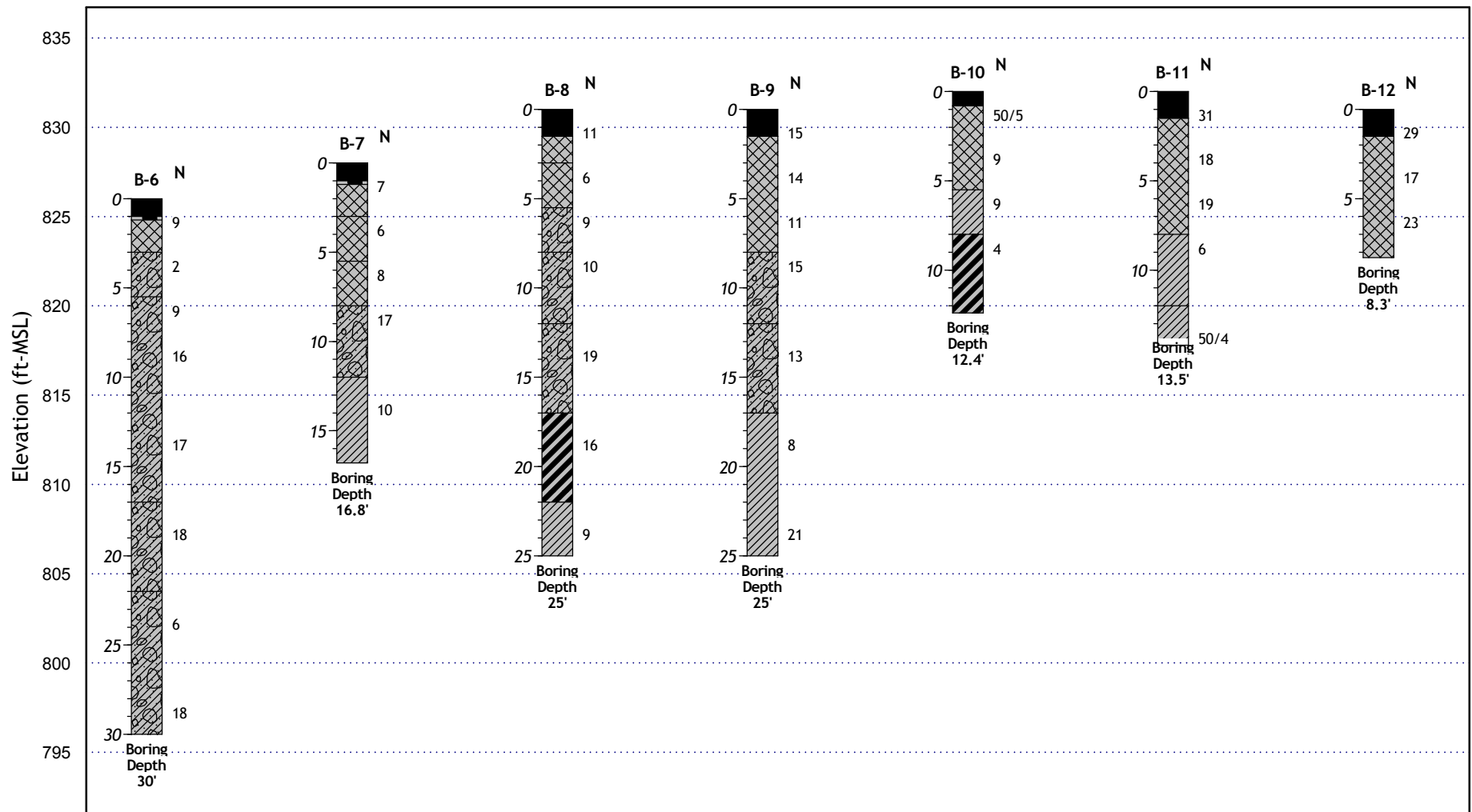
FOR ILLUSTRATION PURPOSES ONLY

| LEGEND                                                                              |                                                                                                                                | FOR ILLUSTRATION PURPOSES ONLY                                                                                                                                                                                                                                                   |                     |                         |                 |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------------|-----------------|
| B-XX                                                                                | BORING LOCATIONS                                                                                                               |                                                                                                                                                                                                                                                                                  |                     |                         |                 |
|  | CSI Cincinnati, LLC<br>11785 Highway Drive Cincinnati, Ohio 45241<br>513.252.2059 Office   888.792.3121 Fax<br>www.csiohio.com | TITLE: BORING LOCATION PLAN                                                                                                                                                                                                                                                      |                     | Project No:<br>CN210109 | Drawn By:<br>GD |
|                                                                                     |                                                                                                                                | PROJECT: Paramount Launch Building<br>Cincinnati, OH                                                                                                                                                                                                                             | Date:<br>7/22/21    | Checked By:<br>JB       |                 |
|                                                                                     |                                                                                                                                |                                                                                                                                                                                                                                                                                  | Scale: Not To Scale | Drawing No:<br>2 of 2   |                 |
|                                                                                     |                                                                                                                                | This drawing is being furnished for this specific project only. Any party accepting this document does so in confidence and agrees that it shall not be duplicated in whole or in part, nor disclosed to others without the consent of Consulting Services Incorporated of Ohio. |                     |                         |                 |



## Geotechnical Boring Information Sheet

| Sample Type Symbols          |          | Definitions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Splitspoon (SPT)             |          | SPT-"Splitspoon" or standard penetration test. Blow counts are number of drops required for a 140 lb hammer dropping 30 inches to drive the sampler 6 inches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Shelby Tube                  |          | N-value is the addition of the last two intervals of the 18-inch sample.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Grab                         |          | Shelby tubes are often called "undisturbed samples". They are directly pushed into the ground, twisted, allowed to rest for a small period of time and then pulled out of the ground. Tops and bottoms are cleaned and then sealed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Rock Core                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Auger Cuttings               |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Surface Symbols              |          | Sample classification is done in general accordance with ASTM D2487 and 2488 using the Unified Soil Classification System (USCS) as a general guide.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Topsoil                      |          | <p>Soil moisture descriptions are based on the recovered sample observations. The descriptors are dry, slightly moist, moist, very moist and wet. These are typically based on relative estimates of the moisture condition of a visual estimation of the soils optimum moisture content (EOMC). Dry is almost in a "dusty" condition usually 6 or more percent below EOMC. Slightly moist is from about 6 to 2 percent below EOMC at a point at which the soil color does not readily change with the addition of water. Moist is usually 2 percent below to 2 percent above EOMC and the point at which the soil will tend to begin forming "balls" under some pressure in the hand. Very moist is usually from about 2 percent to 6 percent above EOMC and also the point at which it's often considered "muddy". Wet soil is usually 6 or more percent above EOMC and often contains free water or the soil is in a saturated state.</p> <p>Silt or Clay is defined at material finer than a standard #200 US sieve (&lt;0.075mm) Sand is defined as material between the size of #200 sieve up to #4 sieve. Gravel is from #4 size sieve material to 3". Cobbles are from 3" to 12". Boulders are over 12".</p> <p>Rock hardness is classified as follows:<br/>           Very Soft: Easily broken by hand pressure<br/>           Soft: Ends can be broken by hand pressure; easily broken with hammer<br/>           Medium: Ends easily broken with hammer; middle requires moderate blow<br/>           Hard: Ends require moderate hammer blow; middle requires several blows<br/>           Very Hard: Many blows with a hammer required to break core</p> <p>Rock Quality Designation (RQD) is defined as total combined length of 4" or longer pieces of core divided by the total core run length; defined in percentage.</p> |
| Asphalt                      |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Concrete                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Lean Clay                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Fat Clay                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Glacial Till                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Sandy Clay                   |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Silt                         |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Elastic Silt                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Lean Clay to Fat Clay        |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Gravelly Clay                |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Sandy Silt                   |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Gravelly Silt                |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Sand                         |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Gravel                       |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Fill                         |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Limestone                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Sandstone                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Shale/Siltstone              |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Weathered Rock               |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Samples Strength Descriptors |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Cohesive Soils:</b>       | <b>N</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Very Soft                    | 0-1      | <p>Water or cave-in observed in borings is at completion of drilling each boring unless otherwise noted.</p> <p>Strata lengths shown on borings represents a rough estimate. Transition may be more abrupt or gradual. Soil borings are representative of that estimated location at that time and are based on recovered samples. Conditions may be different between borings and between sample intervals. Boring information is not to be considered stand alone but should be taken in context with comments and information in the geotechnical report and the means by which the borings are logged, sampled and drilled.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Soft                         | 2-4      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Firm                         | 5-8      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Stiff                        | 9-15     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Very Stiff                   | 16-30    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Hard                         | 31+      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Non-cohesive Soils:</b>   |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Very Loose                   | 0-4      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Loose                        | 5-10     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Firm                         | 11-20    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Very Firm                    | 21-30    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Dense                        | 30-50    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Very Dense                   | 51+      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |







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# TEST BORING LOG

CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # B-6  
JOB # CN210109  
LOGGED BY KR  
APPROVED BY GD

## DRILLING and SAMPLING INFORMATION

Date Started 7/1/21 Contractor Strata Group  
Date Completed 7/1/21 Boring Size 4 in.  
Drill Rig D-50 Boring Method 4" OD SFA  
Weather Rainy 70s Hammer Type Automatic

## TEST DATA

| SOIL CLASSIFICATION |             |             |                                                                                                                                     | Sample No. | Sample Type | Sample Graphics | Recovery (in) | Standard Penetration Blows per 6" [ N-Value ] | Qu- tsf Unconfined Compressive Str | Moisture Content | Liquid Limit (LL) | Plasticity Index | Percent Passing |
|---------------------|-------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------|------------|-------------|-----------------|---------------|-----------------------------------------------|------------------------------------|------------------|-------------------|------------------|-----------------|
| Elev. (ft)          | Depth Scale | Water Level | SURFACE ELEVATION:                                                                                                                  |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
|                     |             |             | ASPHALT (12 INCHES)                                                                                                                 |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 2                   |             |             | GRAVEL (GW) base (4 INCHES)                                                                                                         | 1          | SS          |                 | 16            | 3-4-5 [ 9 ]                                   |                                    | 23.2             |                   |                  |                 |
| 4                   |             |             | FILL : Brown LEAN CLAY (CL) with sand and brick fragments - Moist, Stiff                                                            | 2          | SS          |                 | 16            | 2-1-1 [ 2 ]                                   |                                    | 25.3             |                   |                  |                 |
| 6                   |             |             | Brown LEAN CLAY (CL) with trace rounded gravel, silt, and sand [GLACIAL TILL] - Moist, Soft                                         | 3          | SS          |                 | 18            | 3-4-5 [ 9 ]                                   |                                    | 19.7             |                   |                  |                 |
| 8                   |             |             | Brown and Gray mottled LEAN CLAY (CL) with trace rounded gravel and black oxide nodules [GLACIAL TILL] - Moist, Stiff to Very Stiff | 4          | SS          |                 | 18            | 5-6-10 [ 16 ]                                 |                                    |                  |                   |                  |                 |
| 10                  |             |             |                                                                                                                                     |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 12                  |             |             |                                                                                                                                     |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 14                  |             |             |                                                                                                                                     | 5          | SS          |                 | 18            | 6-8-9 [ 17 ]                                  |                                    | 49.5             |                   |                  |                 |
| 16                  |             |             |                                                                                                                                     |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 18                  |             |             | Brown LEAN CLAY (CL) with trace silt and sand [GLACIAL TILL] - Moist, Very Stiff                                                    | 6          | SS          |                 | 0             | 9-9-9 [ 18 ]                                  |                                    |                  |                   |                  |                 |
| 20                  |             |             |                                                                                                                                     |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 22                  |             |             |                                                                                                                                     |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 24                  |             |             | Brown and gray mottled LEAN CLAY (CL) with trace black oxide nodules, silt, and sand [GLACIAL TILL] - Wet, Stiff to Very Stiff      | 7          | SS          |                 | 18            | 3-3-3 [ 6 ]                                   |                                    | 22.0             | 28                | 11               | 73              |
| 26                  |             |             |                                                                                                                                     |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 28                  |             |             |                                                                                                                                     |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 30                  |             |             |                                                                                                                                     | 8          | SS          |                 | 18            | 5-8-10 [ 18 ]                                 |                                    |                  |                   |                  |                 |
| 32                  |             |             | Boring Terminated at 30 Feet<br>No Refusal                                                                                          |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |
| 34                  |             |             |                                                                                                                                     |            |             |                 |               |                                               |                                    |                  |                   |                  |                 |

## Depth to Groundwater

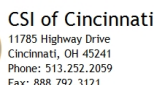
● Noted on Drilling Tools 23.5 ft.  
▽ At Completion \_\_\_\_\_ ft.  
▼ After \_\_\_\_\_ hours \_\_\_\_\_ ft.  
⊠ Cave Depth \_\_\_\_\_ ft.

## Sample Type

SPT- Standard Penetration Test  
SS- Split Spoon  
ST- Shelby Tube  
RC- Rock Core  
CU- Auger Cuttings

## Boring Method

HSA- Hollow Stem Augers  
CFA- Continuous Flight Augers  
MD- Mud Drilling



CLIENT **Model Group**

PROJECT NAME **Peebles Apartments**

PROJECT LOCATION **Cincinnati, Oh**

BORING # **B-7**  
JOB # **CN210109**  
LOGGED BY **KR**  
APPROVED BY **GD**

## TEST DATA

|                |                  |               |                     |
|----------------|------------------|---------------|---------------------|
| Date Started   | <u>7/1/21</u>    | Contractor    | <u>Strata Group</u> |
| Date Completed | <u>7/1/21</u>    | Boring Size   | <u>4 in.</u>        |
| Drill Rig      | <u>D-50</u>      | Boring Method | <u>4" OD SFA</u>    |
| Weather        | <u>Rainy 70s</u> | Hammer Type   | <u>Automatic</u>    |

[illegible]

### Boring Method

- ☐ Noted on Drilling Tools \_\_\_\_\_ ft.  
☐ At Completion \_\_\_\_\_ ft.  
☐ After \_\_\_\_\_ hours \_\_\_\_\_ ft.  
☐ Cave Depth \_\_\_\_\_ ft.

- SPT- Standard Penetration Test  
SS- Split Spoon  
ST- Shelby Tube  
RC- Rock Core  
CU- Auger Cuttings

- HSA- Hollow Stem Augers  
CFA- Continuous Flight Augers  
MD- Mud Drilling



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# TEST BORING LOG

CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # B-8  
JOB # CN210109  
LOGGED BY KR  
APPROVED BY GD

## DRILLING and SAMPLING INFORMATION

Date Started 7/1/21 Contractor Strata Group  
Date Completed 7/1/21 Boring Size 4 in.  
Drill Rig D-50 Boring Method 4" OD SFA  
Weather Rainy 70s Hammer Type Automatic

## TEST DATA

| SOIL CLASSIFICATION |             |             |                                                                                                                       | Sample No. | Sample Type | Sample Graphics | Recovery (in) | Standard Penetration Blows per 6" [ N-Value ] blows | Qu-ts f Unconfined Compressive Str | Moisture Content | Liquid Limit (LL) | Plasticity Index | Percent Passing |
|---------------------|-------------|-------------|-----------------------------------------------------------------------------------------------------------------------|------------|-------------|-----------------|---------------|-----------------------------------------------------|------------------------------------|------------------|-------------------|------------------|-----------------|
| Elev. (ft)          | Depth Scale | Water Level | SURFACE ELEVATION:                                                                                                    |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
|                     |             |             | ASPHALT (1.5 FEET)                                                                                                    |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 2                   |             |             | FILL : Brown WELL GRADED SAND (SW) with asphalt, brick, and rock fragments - Dry, Firm                                | 1          | SS          |                 | 14            | 7-5-6 [ 11 ]                                        |                                    |                  |                   |                  |                 |
| 4                   |             |             | FILL : Gray LEAN CLAY (CL) with sand and asphalt - Wet, Stiff                                                         | 2          | SS          |                 | 18            | 6-5-1 [ 6 ]                                         |                                    | 27.5             |                   |                  |                 |
| 6                   |             |             | Brown and Gray mottled LEAN CLAY (CL) with black oxide nodules and trace rounded gravel [GLACIAL TILL] - Moist, Stiff | 3          | SS          |                 | 18            | 6-5-4 [ 9 ]                                         |                                    | 22.2             | 46                | 27               | 87              |
| 8                   |             |             | Brown and Gray mottled LEAN CLAY (CL) with rounded gravel [GLACIAL TILL] - Moist, Stiff                               | 4          | SS          |                 | 16            | 2-4-6 [ 10 ]                                        |                                    |                  |                   |                  |                 |
| 10                  |             |             | Brown and Gray mottled LEAN CLAY (CL) with rounded gravel [GLACIAL TILL] - Moist, Stiff                               | 5          | SS          |                 | 16            | 5-8-11 [ 19 ]                                       |                                    | 18.5             |                   |                  |                 |
| 12                  |             |             | Brown and Gray mottled FAT CLAY (CH) with rounded gravel [GLACIAL TILL] - Moist, Very Stiff                           | 6          | SS          |                 | 16            | 5-7-9 [ 16 ]                                        |                                    |                  |                   |                  |                 |
| 14                  |             |             | Brown and Gray mottled FAT CLAY (CH) with trace sand [LACUSTRINE] - Moist Very Stiff                                  | 7          | SS          |                 | 16            | 4-4-5 [ 9 ]                                         |                                    |                  |                   |                  |                 |
| 16                  |             |             | Gray LEAN CLAY (CL) with silt and sand [LACUSTRINE] - Moist, Stiff                                                    |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 18                  |             |             | Boring Terminated at 25 Feet No Refusal                                                                               |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 20                  |             |             |                                                                                                                       |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 22                  |             |             |                                                                                                                       |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 24                  |             |             |                                                                                                                       |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 26                  |             |             |                                                                                                                       |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 28                  |             |             |                                                                                                                       |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 30                  |             |             |                                                                                                                       |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 32                  |             |             |                                                                                                                       |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |
| 34                  |             |             |                                                                                                                       |            |             |                 |               |                                                     |                                    |                  |                   |                  |                 |

## Depth to Groundwater

● Noted on Drilling Tools 3.5 ft.  
▽ At Completion \_\_\_\_\_ ft.  
▼ After \_\_\_\_\_ hours \_\_\_\_\_ ft.  
⊠ Cave Depth \_\_\_\_\_ ft.

## Sample Type

SPT- Standard Penetration Test  
SS- Split Spoon  
ST- Shelby Tube  
RC- Rock Core  
CU- Auger Cuttings

## Boring Method

HSA- Hollow Stem Augers  
CFA- Continuous Flight Augers  
MD- Mud Drilling





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# TEST BORING LOG

CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # B-9  
JOB # CN210109  
LOGGED BY KR  
APPROVED BY GD

## DRILLING and SAMPLING INFORMATION

Date Started 7/1/21 Contractor Strata Group  
Date Completed 7/1/21 Boring Size 4 in.  
Drill Rig D-50 Boring Method 4" OD SFA  
Weather Rainy 70s Hammer Type Automatic

## TEST DATA

| SOIL CLASSIFICATION |             |             |                                                                                                                           | Sample No. | Sample Type | Sample Graphics | Recovery (in) | Standard Penet. Blows per 6" [ N-Value ] blow | Qu-tsF Unconfined Compressive St | Moisture Content | Liquid Limit (LL) | Plasticity Index | Percent Passing |  |
|---------------------|-------------|-------------|---------------------------------------------------------------------------------------------------------------------------|------------|-------------|-----------------|---------------|-----------------------------------------------|----------------------------------|------------------|-------------------|------------------|-----------------|--|
| Elev. (ft)          | Depth Scale | Water Level | SURFACE ELEVATION:                                                                                                        |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
|                     |             |             | ASPHALT (1.5 FEET)                                                                                                        |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 2                   |             |             | POSSIBLE FILL: Brown WELL GRADED SAND (SW) with limestone rock fragments and rounded gravel - Dry, Very Firm              | 1          | SS          |                 | 16            | 9-8-7 [ 15 ]                                  |                                  |                  |                   |                  |                 |  |
| 4                   |             |             |                                                                                                                           | 2          | SS          |                 | 16            | 6-9-5 [ 14 ]                                  |                                  |                  |                   |                  |                 |  |
| 6                   |             |             |                                                                                                                           | 3          | SS          |                 | 18            | 5-5-6 [ 11 ]                                  |                                  |                  |                   |                  |                 |  |
| 8                   |             |             | Brown and Gray mottled LEAN CLAY (CL) with limestone rock fragments and rounded gravel [GLACIAL TILL] - Moist, Very Stiff | 4          | SS          |                 | 16            | 4-6-9 [ 15 ]                                  |                                  |                  |                   |                  |                 |  |
| 10                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 12                  |             |             | Brown and Gray mottled LEAN CLAY (CL) with some sand and trace rounded gravel [GLACIAL TILL] - Moist, Very Stiff          | 5          | SS          |                 | 10            | 5-6-7 [ 13 ]                                  |                                  | 18.2             |                   |                  |                 |  |
| 14                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 16                  |             |             | Brown LEAN CLAY (CL) with trace black oxide nodules and shale fragments [RESIDUUM] - Moist, Firm to Very Stiff            | 6          | SS          |                 | 16            | 2-3-5 [ 8 ]                                   |                                  | 26.1             |                   |                  |                 |  |
| 18                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 20                  |             |             |                                                                                                                           | 7          | SS          |                 | 18            | 5-7-14 [ 21 ]                                 |                                  | 23.5             |                   |                  |                 |  |
| 22                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 24                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 26                  |             |             | Boring Terminated at 25 Feet<br>No Refusal                                                                                |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 28                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 30                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 32                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |
| 34                  |             |             |                                                                                                                           |            |             |                 |               |                                               |                                  |                  |                   |                  |                 |  |

### Depth to Groundwater

● Noted on Drilling Tools 14.0 ft.  
▽ At Completion \_\_\_\_\_ ft.  
▼ After \_\_\_\_\_ hours \_\_\_\_\_ ft.  
⊠ Cave Depth \_\_\_\_\_ ft.

### Sample Type

SPT- Standard Penetration Test  
SS- Split Spoon  
ST- Shelby Tube  
RC- Rock Core  
CU- Auger Cuttings

### Boring Method

HSA- Hollow Stem Augers  
CFA- Continuous Flight Augers  
MD- Mud Drilling



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# TEST BORING LOG

CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # B-10  
JOB # CN210109  
LOGGED BY KR  
APPROVED BY GD

## DRILLING and SAMPLING INFORMATION

Date Started 7/2/21 Contractor Strata Group  
Date Completed 7/2/21 Boring Size 4 in.  
Drill Rig D-50 Boring Method 4" OD SFA  
Weather Mostly Sunny 70s Hammer Type Automatic

## TEST DATA

| SOIL CLASSIFICATION |             |             |                                                                                                                                  | Sample No. | Sample Type | Sample Graphics | Recovery (in) | Standard Penet. Blows per 6" [ N-Value ] blow | Qu-ts/ Unconfined Compressive Str | Moisture Content | Liquid Limit (LL) | Plasticity Index | Percent Passing |                                               |
|---------------------|-------------|-------------|----------------------------------------------------------------------------------------------------------------------------------|------------|-------------|-----------------|---------------|-----------------------------------------------|-----------------------------------|------------------|-------------------|------------------|-----------------|-----------------------------------------------|
| Elev. (ft)          | Depth Scale | Water Level | SURFACE ELEVATION:                                                                                                               |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
|                     |             |             | ASPHALT (7 INCHES)                                                                                                               |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 2                   |             |             | FILL : Brown LEAN CLAY (CL) with sand, limestone rock fragments, rounded gravel, and brick fragments - Moist, Stiff to Hard      | 1          | SS          |                 | 6             | 50/5-- [ 50/5 ]                               |                                   | 10.2             |                   |                  | 42              | Encountered Limestone Layer at 2.5 - 3.5 Feet |
| 4                   |             |             |                                                                                                                                  | 2          | SS          |                 | 6             | 4-3-6 [ 9 ]                                   |                                   |                  |                   |                  |                 |                                               |
| 6                   |             |             | Brown LEAN CLAY (CL) with limestone rock fragments and trace black oxide nodules, root hairs, and sand [RESIDUUM] - Moist, Stiff | 3          | SS          |                 | 16            | 4-4-5 [ 9 ]                                   |                                   | 15.8             |                   |                  |                 |                                               |
| 8                   |             |             |                                                                                                                                  | 4          | SS          |                 | 16            | 6-2-2 [ 4 ]                                   |                                   | 42.0             | 62                | 34               | 79              |                                               |
| 10                  |             |             | Brown FAT CLAY (CH) with sand and black oxide nodules [RESIDUUM] - Moist, Soft                                                   |            |             |                 |               |                                               |                                   |                  |                   |                  |                 | Encountered Weathered Bedrock at 11.8 Feet    |
| 12                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 14                  |             |             | Boring Terminated at 12.4 Feet Auger Refusal                                                                                     |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 16                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 18                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 20                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 22                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 24                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 26                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 28                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 30                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 32                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |
| 34                  |             |             |                                                                                                                                  |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |                                               |

### Depth to Groundwater

● Noted on Drilling Tools \_\_\_\_\_ ft.  
▽ At Completion \_\_\_\_\_ ft.  
▼ After \_\_\_\_\_ hours \_\_\_\_\_ ft.  
⊠ Cave Depth \_\_\_\_\_ ft.

### Sample Type

SPT- Standard Penetration Test  
SS- Split Spoon  
ST- Shelby Tube  
RC- Rock Core  
CU- Auger Cuttings

### Boring Method

HSA- Hollow Stem Augers  
CFA- Continuous Flight Augers  
MD- Mud Drilling



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# TEST BORING LOG

CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # B-11  
JOB # CN210109  
LOGGED BY KR  
APPROVED BY GD

## DRILLING and SAMPLING INFORMATION

Date Started 7/1/21 Contractor Strata Group  
Date Completed 7/1/21 Boring Size 4 in.  
Drill Rig D-50 Boring Method 4" OD SFA  
Weather Rainy 70s Hammer Type Automatic

## TEST DATA

| SOIL CLASSIFICATION |             |             |                                                                                                             | Sample No. | Sample Type | Sample Graphics | Recovery (in) | Standard Penet. Blows per 6" [ N-Value ] blow | Qu-ts f Unconfined Compressive St | Moisture Content | Liquid Limit (LL) | Plasticity Index | Percent Passing |
|---------------------|-------------|-------------|-------------------------------------------------------------------------------------------------------------|------------|-------------|-----------------|---------------|-----------------------------------------------|-----------------------------------|------------------|-------------------|------------------|-----------------|
| Elev. (ft)          | Depth Scale | Water Level | SURFACE ELEVATION:                                                                                          |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
|                     |             |             | ASPHALT (1.5 FEET)                                                                                          |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 2                   |             |             | POSSIBLE FILL: Brown WELL GRADED SAND (SW) with rounded gravel and rock fragments - Dry, Very Firm to Dense | 1          | SS          |                 | 14            | 8-14-17 [ 31 ]                                |                                   |                  |                   |                  |                 |
| 4                   |             |             |                                                                                                             | 2          | SS          |                 | 10            | 3-5-13 [ 18 ]                                 |                                   | 3.5              |                   |                  | 20              |
| 6                   |             |             |                                                                                                             | 3          | SS          |                 | 10            | 4-8-11 [ 19 ]                                 |                                   |                  |                   |                  |                 |
| 8                   |             |             | Brown LEAN CLAY (CL) with black oxide nodules [RESIDUUM] - Moist, Stiff                                     | 4          | SS          |                 | 16            | 3-2-4 [ 6 ]                                   |                                   | 31.2             |                   |                  |                 |
| 10                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 12                  |             |             | Brown LEAN CLAY (CL) with limestone rock fragments [RESIDUUM] - Moist, Hard                                 | 5          | SS          |                 | 12            | 7-50/4- [ 50/4 ]                              |                                   |                  |                   |                  |                 |
| 14                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 16                  |             |             | Boring Terminated at 14.2 Feet Auger Refusal                                                                |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 18                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 20                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 22                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 24                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 26                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 28                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 30                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 32                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |
| 34                  |             |             |                                                                                                             |            |             |                 |               |                                               |                                   |                  |                   |                  |                 |

### Depth to Groundwater

● Noted on Drilling Tools \_\_\_\_\_ ft.  
▽ At Completion \_\_\_\_\_ ft.  
▼ After \_\_\_\_\_ hours \_\_\_\_\_ ft.  
⊠ Cave Depth \_\_\_\_\_ ft.

### Sample Type

SPT- Standard Penetration Test  
SS- Split Spoon  
ST- Shelby Tube  
RC- Rock Core  
CU- Auger Cuttings

### Boring Method

HSA- Hollow Stem Augers  
CFA- Continuous Flight Augers  
MD- Mud Drilling



CSI of Cincinnati  
11785 Highway Drive  
Cincinnati, OH 45241  
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Fax: 888.792.3121

# TEST BORING LOG

CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # B-12  
JOB # CN210109  
LOGGED BY KR  
APPROVED BY GD

## DRILLING and SAMPLING INFORMATION

Date Started 7/1/21 Contractor Strata Group  
Date Completed 7/1/21 Boring Size 4 in.  
Drill Rig D-50 Boring Method 4" OD SFA  
Weather Rainy 70s Hammer Type Automatic

## TEST DATA

| SOIL CLASSIFICATION |             |             |                                                                                                                       | Sample No. | Sample Type | Sample Graphics | Recovery (in) | Standard Penetration Test Blows per 6" [ N-Value ] blows | Qu-tsF Unconfined Compressive Strength | Moisture Content | Liquid Limit (LL) | Plasticity Index | Percent Passing |  |
|---------------------|-------------|-------------|-----------------------------------------------------------------------------------------------------------------------|------------|-------------|-----------------|---------------|----------------------------------------------------------|----------------------------------------|------------------|-------------------|------------------|-----------------|--|
| Elev. (ft)          | Depth Scale | Water Level | SURFACE ELEVATION:                                                                                                    |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
|                     |             |             | ASPHALT (1.5 FEET)                                                                                                    |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 2                   |             |             | POSSIBLE FILL: Brown WELL GRADED SAND (SW) with limestone rock fragments and rounded gravel - Dry, Very Firm to Dense | 1          | SS          | ⊗               | 16            | 9-13-16 [ 29 ]                                           |                                        | 4.0              |                   |                  |                 |  |
| 4                   |             |             |                                                                                                                       | 2          | SS          | ⊗               | 10            | 4-7-10 [ 17 ]                                            |                                        |                  |                   |                  |                 |  |
| 6                   |             |             |                                                                                                                       | 3          | SS          | ⊗               | 10            | 4-12-11 [ 23 ]                                           |                                        | 4.3              |                   |                  | 21              |  |
| 8                   |             |             | Boring Terminated at 8.3 Feet Auger Refusal                                                                           |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 10                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 12                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 14                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 16                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 18                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 20                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 22                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 24                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 26                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 28                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 30                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 32                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |
| 34                  |             |             |                                                                                                                       |            |             |                 |               |                                                          |                                        |                  |                   |                  |                 |  |

### Depth to Groundwater

● Noted on Drilling Tools \_\_\_\_\_ ft.  
▽ At Completion \_\_\_\_\_ ft.  
▼ After \_\_\_\_\_ hours \_\_\_\_\_ ft.  
⊗ Cave Depth \_\_\_\_\_ ft.

### Sample Type

SPT- Standard Penetration Test  
SS- Split Spoon  
ST- Shelby Tube  
RC- Rock Core  
CU- Auger Cuttings

### Boring Method

HSA- Hollow Stem Augers  
CFA- Continuous Flight Augers  
MD- Mud Drilling



CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # TP-1  
JOB # CN210109  
LOGGED BY GD  
APPROVED BY GD

## SAMPLING INFORMATION

## TEST DATA

Date Started 4/11/22 Contractor N/A  
Date Completed 4/11/22 Test Pit Size N/A in.  
Equipment Track Hoe Excavation Method Excavation  
Weather \_\_\_\_\_ DCP Type N/A

| SOIL CLASSIFICATION |                                                                                 | Sample No. | Sample Type | Sample Graph | Groundwater | Dynamic Con<br>N-Value (blow | Qu-tsf Uncon<br>Compressive | Moisture Con | Liquid Limit ( | Plastic Limit | Percent Passi |  |  |
|---------------------|---------------------------------------------------------------------------------|------------|-------------|--------------|-------------|------------------------------|-----------------------------|--------------|----------------|---------------|---------------|--|--|
| Depth<br>Scale      | SURFACE ELEVATION                                                               |            |             |              |             |                              |                             |              |                |               |               |  |  |
| 2                   | FILL: Brown SAND (SP) with rounded gravel and trace construction debris - moist |            |             |              |             |                              |                             |              |                |               |               |  |  |
| 4                   |                                                                                 |            |             |              |             |                              |                             |              |                |               |               |  |  |
| 6                   | Brown LEAN CLAY (CL) with trace rounded gravel and sand [GLACIAL TILL] - moist  |            |             |              |             |                              |                             |              |                |               |               |  |  |
| 8                   |                                                                                 |            |             |              |             |                              |                             |              |                |               |               |  |  |
| 10                  | Test Pit terminated due to sand cave in at 8.5 feet                             |            |             |              |             |                              |                             |              |                |               |               |  |  |

## Depth to Groundwater

● Entry From Side Walls \_\_\_\_\_ ft.  
☼ Cave Depth \_\_\_\_\_ ft.



CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # TP-2  
JOB # CN210109  
LOGGED BY GD  
APPROVED BY GD

## SAMPLING INFORMATION

Date Started 4/11/22 Contractor N/A  
Date Completed 4/11/22 Test Pit Size N/A in.  
Equipment Track Hoe Excavation Method Excavation  
Weather \_\_\_\_\_ DCP Type N/A

## TEST DATA

| SOIL CLASSIFICATION |                                                                                | Sample No. | Sample Type | Sample Graphics | Groundwater | Dynamic Cone Penetrometer Test N-Value (blows/3.5") | Qu-tsf Unconfined Compressive Strength | Moisture Content % | Liquid Limit (LL) | Plastic Limit (PL) | Percent Passing #200 Sieve | Remarks |
|---------------------|--------------------------------------------------------------------------------|------------|-------------|-----------------|-------------|-----------------------------------------------------|----------------------------------------|--------------------|-------------------|--------------------|----------------------------|---------|
| Depth Scale         | SURFACE ELEVATION                                                              |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 2                   | FIL: Brown SAND (SP) with rounded gravel and trace construction debris - moist |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 4                   |                                                                                |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 6                   |                                                                                |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 8                   |                                                                                |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 10                  |                                                                                |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 12                  |                                                                                |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 14                  | Test Pit terminated at 12 feet                                                 |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |

## Depth to Groundwater

● Entry From Side Walls \_\_\_\_\_ ft.  
☼ Cave Depth \_\_\_\_\_ ft.





CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # TP-3  
JOB # CN210109  
LOGGED BY GD  
APPROVED BY GD

## SAMPLING INFORMATION

Date Started 4/11/22 Contractor N/A  
Date Completed 4/11/22 Test Pit Size N/A in.  
Equipment Track Hoe Excavation Method Excavation  
Weather \_\_\_\_\_ DCP Type N/A

## TEST DATA

| SOIL CLASSIFICATION |                                                                                                        | Sample No. | Sample Type | Sample Graphics | Groundwater | Dynamic Cone Penetrometer Test N-Value (blows/3.5") | Qu-tsf Unconfined Compressive Strength | Moisture Content % | Liquid Limit (LL) | Plastic Limit (PL) | Percent Passing #200 Sieve | Remarks |
|---------------------|--------------------------------------------------------------------------------------------------------|------------|-------------|-----------------|-------------|-----------------------------------------------------|----------------------------------------|--------------------|-------------------|--------------------|----------------------------|---------|
| Depth Scale         | SURFACE ELEVATION                                                                                      |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 2                   | FILL: Brown SAND (SP) with rounded gravel and trace construction debris - moist                        |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 4                   | Brown and gray mottled LEAN CLAY (CL) with trace rounded gravel, silt, and sand [GLACIAL TILL] - moist |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 6                   |                                                                                                        |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 8                   |                                                                                                        |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 10                  | Test Pit terminated at 8.5 feet                                                                        |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |

## Depth to Groundwater

● Entry From Side Walls \_\_\_\_\_ ft.  
☼ Cave Depth \_\_\_\_\_ ft.



CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # TP-4  
JOB # CN210109  
LOGGED BY GD  
APPROVED BY GD

## SAMPLING INFORMATION

Date Started 4/11/22 Contractor N/A  
Date Completed 4/11/22 Test Pit Size N/A in.  
Equipment Track Hoe Excavation Method Excavation  
Weather \_\_\_\_\_ DCP Type N/A

## TEST DATA

| SOIL CLASSIFICATION |                                                                               |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |                                    |
|---------------------|-------------------------------------------------------------------------------|------------|-------------|-----------------|-------------|-----------------------------------------------------|----------------------------------------|--------------------|-------------------|--------------------|----------------------------|------------------------------------|
| Depth Scale         | SURFACE ELEVATION                                                             | Sample No. | Sample Type | Sample Graphics | Groundwater | Dynamic Cone Penetrometer Test N-Value (blows/3.5") | Qu-tsf Unconfined Compressive Strength | Moisture Content % | Liquid Limit (LL) | Plastic Limit (PL) | Percent Passing #200 Sieve | Remarks                            |
| 2                   | FILL: Brown SAND (SP) with rounded gravel and trace construction debris - wet |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |                                    |
| 4                   |                                                                               |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |                                    |
| 6                   | FILL: Blue and gray LEAN CLAY (CL) with trace roots and debris - moist        |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |                                    |
| 8                   | Blue and gray mottled LEAN CLAY (CL) [GLACIAL TILL] - moist                   |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |                                    |
| 10                  | Test Pit terminated at 9 feet                                                 |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            | Drain tile encountered at 4.5 feet |

## Depth to Groundwater

● Entry From Side Walls \_\_\_\_\_ ft.  
☒ Cave Depth \_\_\_\_\_ ft.



CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # TP-5  
JOB # CN210109  
LOGGED BY GD  
APPROVED BY GD

## SAMPLING INFORMATION

Date Started 4/11/22 Contractor N/A  
Date Completed 4/11/22 Test Pit Size N/A in.  
Equipment Track Hoe Excavation Method Excavation  
Weather \_\_\_\_\_ DCP Type N/A

## TEST DATA

| SOIL CLASSIFICATION |                                                                                                          | Sample No. | Sample Type | Sample Graphics | Groundwater | Dynamic Cone Penetrometer Test N-Value (blows/3.5") | Qu-tsf Unconfined Compressive Strength | Moisture Content % | Liquid Limit (LL) | Plastic Limit (PL) | Percent Passing #200 Sieve | Remarks |
|---------------------|----------------------------------------------------------------------------------------------------------|------------|-------------|-----------------|-------------|-----------------------------------------------------|----------------------------------------|--------------------|-------------------|--------------------|----------------------------|---------|
| Depth Scale         | SURFACE ELEVATION                                                                                        |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 2                   | FILL: Brown and black SAND (SP) with rounded gravel and construction debris - moist                      |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 4                   | Dark brown to brown LEAN CLAY (CL) with some silt, trace rounded gravel, and sand [GLACIAL TILL] - moist |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 6                   |                                                                                                          |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 8                   |                                                                                                          |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 10                  | Test Pit terminated at 8 feet                                                                            |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |

## Depth to Groundwater

● Entry From Side Walls \_\_\_\_\_ ft.  
☒ Cave Depth \_\_\_\_\_ ft.



CLIENT Model Group  
PROJECT NAME Peebles Apartments  
PROJECT LOCATION Cincinnati, Oh

BORING # TP-6  
JOB # CN210109  
LOGGED BY GD  
APPROVED BY GD

## SAMPLING INFORMATION

Date Started 4/11/22 Contractor N/A  
Date Completed 4/11/22 Test Pit Size N/A in.  
Equipment Track Hoe Excavation Method Excavation  
Weather \_\_\_\_\_ DCP Type N/A

## TEST DATA

| SOIL CLASSIFICATION |                                                                                    | Sample No. | Sample Type | Sample Graphics | Groundwater | Dynamic Cone Penetrometer Test N-Value (blows/3.5") | Qu-tsf Unconfined Compressive Strength | Moisture Content % | Liquid Limit (LL) | Plastic Limit (PL) | Percent Passing #200 Sieve | Remarks |
|---------------------|------------------------------------------------------------------------------------|------------|-------------|-----------------|-------------|-----------------------------------------------------|----------------------------------------|--------------------|-------------------|--------------------|----------------------------|---------|
| Depth Scale         | SURFACE ELEVATION                                                                  |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 2                   | FILL: Brown SAND (SP) with rounded gravel and construction debris - moist          |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 4                   | FILL: Brown and gray mottled LEAN CLAY (CL) with trace construction debris - moist |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 6                   | Dark brown LEAN CLAY (CL) with some silt [GLACIAL TILL] - moist                    |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 8                   |                                                                                    |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |
| 10                  | Test Pit terminated at 9 feet                                                      |            |             |                 |             |                                                     |                                        |                    |                   |                    |                            |         |

## Depth to Groundwater

● Entry From Side Walls \_\_\_\_\_ ft.  
☼ Cave Depth \_\_\_\_\_ ft.

## FIELD TESTING PROCEDURES

Field Operations: The general field procedures employed by CSI are summarized in ASTM D 420 which is entitled "Investigating and Sampling Soils and Rocks for Engineering Purposes." This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the subsurface conditions. These techniques are:

- a. Continuous 2-1/2 or 3-1/4 inch I.D. hollow stem augers;
- b. Wash borings using roller cone or drag bits (mud or water);
- c. Continuous flight augers (ASTM D 1425).

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by the chief driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM D 2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

The detailed data collection methods used during this study are discussed on the following pages.

Soil Test Borings: Soil test borings were made at the site at locations shown on the attached Boring Plan. Soil sampling and penetration testing were performed in accordance with ASTM D 1586.

The borings were made by mechanically twisting a hollow stem steel auger into the soil. At regular intervals, the drilling tools were removed and soil samples obtained with a standard 1.4 inch I.D., 2 inch O.D., split tube sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "penetration resistance". The penetration resistance, when properly evaluated, is an index to the soil strength and foundation supporting capability.

Representative portions of the soil samples, thus obtained, were placed in glass jars and transported to the laboratory. In the laboratory, the samples were examined to verify the driller's field classifications. Test Boring Records are attached which graphically show the soil descriptions and penetration resistances.

Core Drilling: Refusal materials are materials that cannot be penetrated with the soil drilling methods employed. Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Prior to coring, casing is set in the drilled hole through the overburden soils, if necessary, to keep the hole from caving. Refusal materials are then cored according to ASTM D 2113 using a diamond-studded bit fastened to the

end of a hollow double tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovered is measured, the samples are removed and the core is placed in boxes for storage.

The core samples are returned to our laboratory where the refusal material is identified and the percent core recovery and rock quality designation is determined by a soils engineer or geologist. The percent core recovery is the ratio of the sample length obtained to the depth drilled, expressed as a percent. The rock quality designation (RQD) is obtained by summing up the length of core recovered, including only the pieces of core which are four inches or longer, and dividing by the total length drilled. The percent core recovery and RQD are related to soundness and continuity of the refusal material. Refusal material descriptions, recoveries, and RQDs are shown on the "Test Boring Records".

Hand Auger Borings and Dynamic Cone Penetration Testing: Hand auger borings are performed manually by CSI field personnel. This consists of manually twisting hand auger tools into the subsurface and extracting "grab" or baggie samples at intervals determined by the project engineer. At the sample intervals, dynamic cone penetration (DCP) testing is performed. This testing involves the manual raising and dropping of a 20 pound hammer, 18 inches. This "driver" head drives a solid-1 $\frac{3}{4}$  inch diameter cone into the ground. DCP "counts" are the number of drops it takes for the hammer to drive three 1 $\frac{3}{4}$  inch increments, recorded as X-Y-Z values.

Test Pits: Test pits are excavated by the equipment available, often a backhoe or trackhoe. The dimensions of the test pits are based on the equipment used and the power capacity of the equipment. Samples are taken from the spoils of typical buckets of the excavator and sealed in jars or "Ziplock" baggies. Dynamic Cone Penetration or hand probe testing is often performed in the upper few feet as OSHA standards allow. Refusal is deemed as the lack of advancement of the equipment with reasonable to full machine effort.

Water Level Readings: Water table readings are normally taken in conjunction with borings and are recorded on the "Test Boring Records". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The time of boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.



## Summary of Laboratory Results

Sheet 1 of 2

| Borehole | Depth | Sample Type | Liquid Limit | Plastic Limit | Plasticity Index | Classification          | Water Content (%) | Unconfined Compressive Strength (tsf) | Dry Density (pcf) | Wet Density (pcf) | Max. Dry Density (pcf) | Opt. Water Content (%) | CBR | Swell (%) | RQD | Percent Recovery | Percent Finer (No. 200) |
|----------|-------|-------------|--------------|---------------|------------------|-------------------------|-------------------|---------------------------------------|-------------------|-------------------|------------------------|------------------------|-----|-----------|-----|------------------|-------------------------|
| B-1      | 1.0   | SS          | 32           | 17            | 15               | LEAN CLAY(CL)           | 17.5              |                                       |                   |                   |                        |                        |     |           |     |                  | 87                      |
| B-1      | 6.0   | SS          |              |               |                  |                         | 15.1              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-1      | 13.5  | SS          | 56           | 24            | 32               | FAT CLAY(CH)            | 24.6              |                                       |                   |                   |                        |                        |     |           |     |                  | 98                      |
| B-2      | 3.5   | SS          |              |               |                  |                         | 28.7              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-2      | 8.5   | SS          |              |               |                  |                         | 26.1              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-3      | 1.0   | SS          |              |               |                  |                         | 12.4              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-3      | 3.5   | SS          |              |               |                  |                         | 16.3              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-3      | 8.5   | SS          |              |               |                  |                         | 28.3              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-4      | 1.0   | SS          |              |               |                  |                         | 21.0              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-4      | 3.5   | SS          | 54           | 20            | 34               | FAT CLAY(CH)            | 23.3              |                                       |                   |                   |                        |                        |     |           |     |                  | 92                      |
| B-4      | 8.5   | SS          |              |               |                  |                         | 12.1              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-4      | 13.5  | SS          |              |               |                  |                         | 7.4               |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-5      | 3.5   | SS          |              |               |                  |                         | 22.9              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-5      | 8.5   | SS          |              |               |                  |                         | 11.2              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-6      | 1.0   | SS          |              |               |                  |                         | 23.2              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-6      | 3.5   | SS          |              |               |                  |                         | 25.3              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-6      | 6.0   | SS          |              |               |                  |                         | 19.7              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-6      | 13.5  | SS          |              |               |                  |                         | 49.5              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-6      | 23.5  | SS          | 28           | 17            | 11               | LEAN CLAY with SAND(CL) | 22.0              |                                       |                   |                   |                        |                        |     |           |     |                  | 73                      |
| B-7      | 1.0   | SS          |              |               |                  |                         | 23.2              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-7      | 3.5   | SS          |              |               |                  |                         | 25.9              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-7      | 8.5   | SS          |              |               |                  |                         | 18.9              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-7      | 13.5  | SS          |              |               |                  |                         | 28.9              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-8      | 3.5   | SS          |              |               |                  |                         | 27.5              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-8      | 6.0   | SS          | 46           | 19            | 27               | LEAN CLAY(CL)           | 22.2              |                                       |                   |                   |                        |                        |     |           |     |                  | 87                      |
| B-8      | 13.5  | SS          |              |               |                  |                         | 18.5              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |



### CSI of Cincinnati

11785 Highway Drive  
Cincinnati, OH 45241  
Phone: 513.252.2059  
Fax: 888.792.3121

SS - Split Spoon Sample  
GRAB - Bulk Grab Sample

### PROJECT INFORMATION

Client: Model Group  
Project Name: Peebles Apartments  
Project Number: CN210109  
Project Location: Cincinnati, Oh

## Summary of Laboratory Results

Sheet 2 of 2

| Borehole | Depth | Sample Type | Liquid Limit | Plastic Limit | Plasticity Index | Classification              | Water Content (%) | Unconfined Compressive Strength (tsf) | Dry Density (pcf) | Wet Density (pcf) | Max. Dry Density (pcf) | Opt. Water Content (%) | CBR | Swell (%) | RQD | Percent Recovery | Percent Finer (No. 200) |
|----------|-------|-------------|--------------|---------------|------------------|-----------------------------|-------------------|---------------------------------------|-------------------|-------------------|------------------------|------------------------|-----|-----------|-----|------------------|-------------------------|
| B-9      | 13.5  | SS          |              |               |                  |                             | 18.2              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-9      | 18.5  | SS          |              |               |                  |                             | 26.1              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-9      | 23.5  | SS          |              |               |                  |                             | 23.5              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-10     | 1.0   | SS          |              |               |                  |                             | 10.2              |                                       |                   |                   |                        |                        |     |           |     |                  | 42                      |
| B-10     | 6.0   | SS          |              |               |                  |                             | 15.8              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-10     | 8.5   | SS          | 62           | 28            | 34               | FAT CLAY with SAND(CH)      | 42.0              |                                       |                   |                   |                        |                        |     |           |     |                  | 79                      |
| B-11     | 3.5   | SS          |              |               |                  |                             | 3.5               |                                       |                   |                   |                        |                        |     |           |     |                  | 20                      |
| B-11     | 8.5   | SS          |              |               |                  |                             | 31.2              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-12     | 1.0   | SS          |              |               |                  |                             | 4.0               |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-12     | 6.0   | SS          |              |               |                  |                             | 4.3               |                                       |                   |                   |                        |                        |     |           |     |                  | 21                      |
| B-13     | 3.5   | SS          |              |               |                  |                             | 24.5              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-13     | 6.0   | SS          | 23           | 16            | 7                | SILTY CLAY with SAND(CL-ML) | 14.3              |                                       |                   |                   |                        |                        |     |           |     |                  | 83                      |
| B-13     | 8.5   | SS          |              |               |                  |                             | 24.0              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |
| B-14     | 1.0   | SS          | 32           | 16            | 16               | LEAN CLAY(CL)               | 17.0              |                                       |                   |                   |                        |                        |     |           |     |                  | 88                      |
| B-14     | 6.0   | SS          |              |               |                  |                             | 16.8              |                                       |                   |                   |                        |                        |     |           |     |                  |                         |



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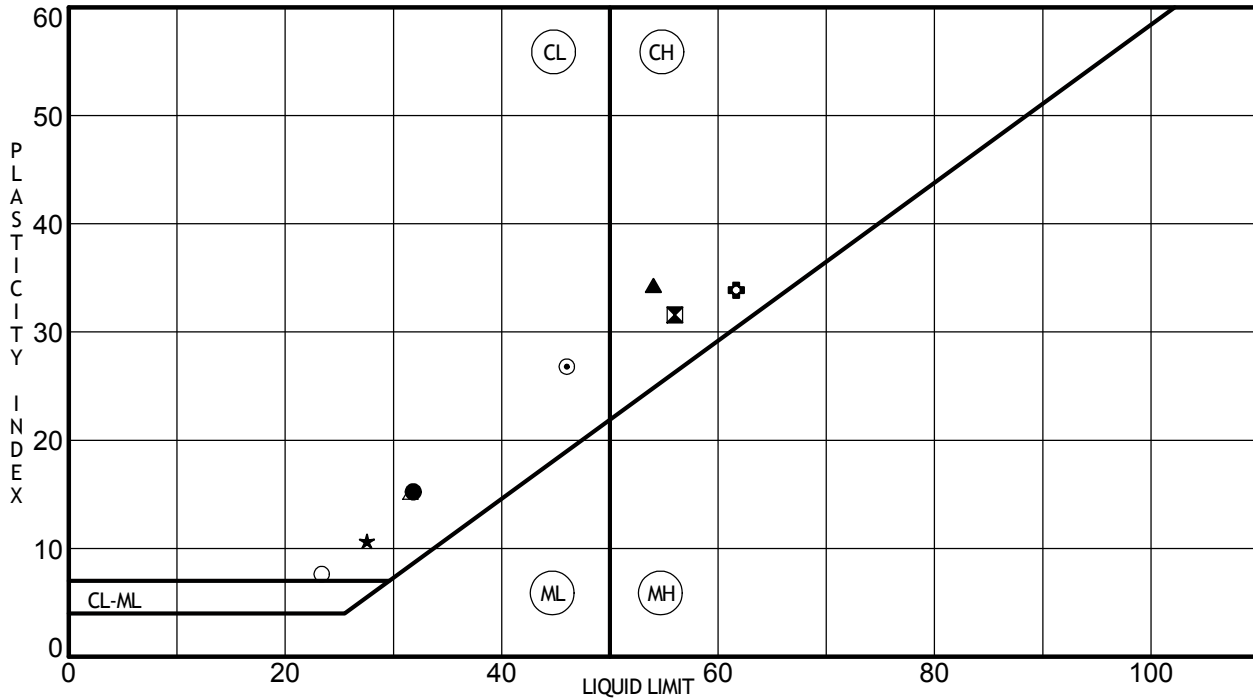
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SS - Split Spoon Sample  
GRAB - Bulk Grab Sample

### PROJECT INFORMATION

Client: Model Group  
Project Name: Peebles Apartments  
Project Number: CN210109  
Project Location: Cincinnati, Oh

# Liquid and Plastic Limits Test Report

[illegible]

## CSI of Cincinnati

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Phone: 513.252.2059  
Fax: 888.792.3121

## PROJECT INFORMATION

Client: Model Group  
Project Name: Peebles Apartments  
Project Number: CN210109  
Project Location: Cincinnati, Oh

## LABORATORY TESTING PROCEDURES

Soil Classification: Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Test Boring Records."

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D 2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

Rock Classification: Rock classifications provide a general guide to the engineering properties of various rock types and enable the engineer to apply past experience to current situations. In our explorations, rock core samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The rock cores are classified according to relative hardness and RQD (see Guide to Rock Classification Terminology), color, and texture. These classification descriptions are included on our Test Boring Records.

Atterberg Limits: Portions of the samples are taken for Atterberg Limits testing to determine the plasticity characteristics of the soil. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes sufficiently "wet" to flow as a heavy viscous fluid. The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into tiny threads. The liquid limit and plastic limit are determined in accordance with ASTM D 4318.

Moisture Content: The Moisture Content is determined according to ASTM D 2216.

Percent Finer Than 200 Sieve: Selected samples of soils are washed through a number 200 sieve to determine the percentage of material less than 0.074 mm in diameter.

Rock Strength Tests: To obtain strength data for rock materials encountered, unconfined compression tests are performed on selected samples. In the unconfined compression test, a cylindrical portion of the rock core is subjected to increasing axial load until it fails. The pressure required to produce failure is recorded, corrected for the length to diameter ratio of the core and reported.

Compaction Tests: Compaction tests are run on representative soil samples to determine the dry density obtained by a uniform compactive effort at varying moisture contents. The results of the test are used to determine the moisture content and unit weight desired in the field for similar soils. Proper field compaction is necessary to decrease future settlements, increase the shear strength of the soil and decrease the permeability of the soil.

The two most commonly used compaction tests are the Standard Proctor test and the Modified Proctor test. They are performed in accordance with ASTM D 698 and D 1557, respectively. Generally, the Standard Proctor compaction test is run on samples from building or parking areas where small compaction equipment is anticipated. The Modified compaction test is generally performed for heavy structures, highways, and other areas where large compaction equipment is expected. In both tests a representative soil sample is placed in a mold and compacted with a compaction hammer. Both tests have three alternate methods.

| Test              | Method | Hammer Wt./Fall | Mold Diam. | Run on Material Finer Than | No. of Layers | No. of Blows/Layer |
|-------------------|--------|-----------------|------------|----------------------------|---------------|--------------------|
| Standard<br>D 698 | A      | 5.5 lb./12"     | 4"         | No. 4 sieve                | 3             | 25                 |
|                   | B      | 5.5 lb./12"     | 4"         | 3/8" sieve                 | 3             | 25                 |
|                   | C      | 5.5 lb./12"     | 6"         | 3/4" sieve                 | 3             | 56                 |

| Test               | Method | Hammer Wt./Fall | Mold Diam. | Run on Material Finer Than | No. of Layers | No. of Blows/Layer |
|--------------------|--------|-----------------|------------|----------------------------|---------------|--------------------|
| Modified<br>D 1557 | A      | 10 lb./18"      | 4"         | No. 4 sieve                | 5             | 25                 |
|                    | B      | 10 lb./18"      | 4"         | 3/8" sieve                 | 5             | 25                 |
|                    | C      | 10 lb./18"      | 6"         | 3/4" sieve                 | 5             | 56                 |

The moisture content and unit weight of each compacted sample is determined. Usually 4 to 5 such tests are run at different moisture contents. Test results are presented in the form of a dry unit weight versus moisture content curve. The compaction method used and any deviations from the recommended procedures are noted in this report.

Laboratory California Bearing Ratio Tests: The California Bearing Ratio, generally abbreviated to CBR, is a punching shear test and is a comparative measure of the shearing resistance of a soil. It provides data that is a semi-empirical index of the strength and deflection characteristics of a soil. The CBR is used with empirical curves to design pavement structures.

A laboratory CBR test is performed according to ASTM D 1883. The results of the compaction tests are utilized in compacting the test sample to the desired density and moisture content for the laboratory California Bearing Ratio test. A representative sample is compacted to a specified density at a specified moisture content. The test is performed on a 6-inch diameter, 4.58-inch-thick disc of compacted soil that is confined in a cylindrical steel mold. The sample is compacted in accordance with Method C of ASTM D 698 or D 1557.

CBR tests may be run on the compacted samples in either soaked or unsoaked conditions. During testing, a piston approximately 2 inches in diameter is forced into the soil sample at the rate of 0.05 inch per minute to a depth of 0.5 inch to determine the resistance to penetration. The CBR is the percentage of the load it takes to penetrate the soil to a 0.1 inch depth compared to the load it takes to penetrate a standard crushed stone to the same depth. Test results are typically shown graphically.

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## SECTION 010000 - GENERAL REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes:

1. Administrative requirements, procedural requirements, temporary facilities and controls, performance requirements.
2. See Part 3 of this Section for the following:
  - a. Schedule of Allowances
  - b. Schedule of Alternates
  - c. Construction Phase Substitution Request Form

B. Project Identification: **PARAMOUNT WORKS**

C. Project Location: 2505 Kemper Ln.  
Cincinnati, OH 45206

D. Owner: Model Group  
1826 Race Street.  
Cincinnati, OH 45202

E. Architect: New Republic Architecture  
1936 Race Street, Suite C101  
Cincinnati, OH 45202

F. Other Owner Consultants: The Owner may retain has retained the services of the following design professionals under separate agreement from the Owner/Architect Agreement who have prepared designated portions of the Contract Documents. The Following other Owner consultants' project documents are included in the Project Manual and Project Drawings as a requirement of the Client/Owner for permit and bidding purposes, and are provided only for reference purposes for construction of the project and for convenience of the bidders and contractors. New Republic Architecture takes no responsibility whatsoever for the services performed by the following other Owner Consultants, for any breach of contract of the other Owner consultants, nor for the content, accuracy, negligence, errors or omissions of the other Owner consultants' project documents. Furthermore, New Republic Architecture is not in charge of the following other Owner consultants, and has no responsibility for coordinating the services or project documents of the other Owners consultants.

1. Sustainability Design Consultant:

SOL Design Consulting  
501 East 13<sup>th</sup> Street  
Cincinnati, OH 45202

2. Geotechnical Engineering:

Consulting Services Incorporated  
11785 Highway Drive, Suite 100B  
Cincinnati, OH 45241

- G. Access to Site: Contractor shall have full use of Project site for construction operations during construction period.
- H. On-Site Work Hours: Limit work on the project only as required by authorities having jurisdiction.
- I. Existing Utility Interruptions: Notify Owner not less than two days in advance of proposed utility interruptions. Provide temporary utility services according to requirements indicated
- J. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

## 1.2 SUBMITTALS

- A. Provide the action and informational submittals identified in each article of this Section.

## 1.3 ALLOWANCES

- A. Selection and Purchase: At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
  - 1. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
  - 2. Purchase products and systems selected by Architect from the designated supplier.
- B. Action Submittals: Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- C. Informational Submittals:
  - 1. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
  - 2. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
  - 3. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.
- D. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.
- E. Allowances: Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to

products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

- F. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
- G. Schedule of Allowances: A Schedule of Allowances is indicated in Part 3 of this Section.

#### 1.4 UNIT PRICES

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.
- B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3 of this Section.

#### 1.5 ALTERNATES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

## 1.6 SUBSTITUTION PROCEDURES

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use facsimile of form provided at the end of this Section.
  2. Provide Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
  3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within days of receipt of a request for substitution. Architect will notify Contractor or Construction Manager of acceptance or rejection of proposed substitution within time allocated.
- B. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.
- C. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.
- D. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Requested substitution provides sustainable design characteristics that specified product provided for achieving LEED prerequisites and credits.
    - c. Substitution request is fully documented and properly submitted.
    - d. Requested substitution will not adversely affect Contractor's construction schedule.
    - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - f. Requested substitution is compatible with other portions of the Work.
    - g. Requested substitution has been coordinated with other portions of the Work.
    - h. Requested substitution provides specified warranty.
    - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- E. Substitutions for Convenience: Architect will consider requests for substitution if received within days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect

will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
  - b. Requested substitution does not require extensive revisions to the Contract Documents.
  - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - d. Substitution request is fully documented and properly submitted.
  - e. Requested substitution will not adversely affect Contractor's construction schedule.
  - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - g. Requested substitution is compatible with other portions of the Work.
  - h. Requested substitution has been coordinated with other portions of the Work.
  - i. Requested substitution provides specified warranty.
  - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
2. The Architect has the right to reject a substitution for convenience even if all of the above requirements are met. The Contractor may not dispute the Architect's final decision.

## 1.7 PROJECT MANAGEMENT AND COORDINATION

- A. Informational Submittals: Subcontract List; prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
  3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

- E. Coordination Drawings: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
- F. Requests for Information (RFIs): Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  - 1. Architect or Construction Manager will return without response those RFIs submitted to Architect by other entities controlled by Contractor. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
  - 2. Architect's or Construction Manager's Action: Architect or Construction Manager will review each RFI, determine action required, and respond. Allow seven working days for Architect's or Construction Manager's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.
    - a. The following RFIs will be returned without action:
      - 1) Requests for approval of submittals.
      - 2) Requests for approval of substitutions.
      - 3) Requests for approval of Contractor's means and methods.
      - 4) Requests for coordination information already indicated in the Contract Documents.
      - 5) Requests for adjustments in the Contract Time or the Contract Sum.
      - 6) Requests for interpretation of Architect's actions on submittals.
      - 7) Incomplete RFIs or inaccurately prepared RFIs.
  - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
  - 4. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within seven days of receipt of the RFI response.
  - 5. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number.
- G. Digital Project Management Procedures
  - 1. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.
    - a. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
    - b. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
    - c. Contractor shall execute a data licensing agreement in the form provided by the Architect.
- H. PDF Document Preparation: Where PDFs are required to be submitted to Architect or Construction Manager, prepare as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

I. Project Meetings

1. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1.8 SUBMITTAL PROCEDURES

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect or Construction Manager and additional time for handling and reviewing submittals required by those corrections.

B. Submittal Administrative Requirements

1. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - b. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - c. Architect or Construction Manager reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
2. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's or Construction Manager's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - a. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect or Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
  - b. Resubmittal Review: Allow 15 days for review of each resubmittal.
1. Electronic Submittals: Provide all submittals in electronic format if possible. Identify and incorporate information in each electronic submittal file as follows:
  - a. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.



- b. Name file with submittal number or other unique identifier, including revision identifier.
      - 1) Example: Project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
    - c. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect or Construction Manager.
  - 2. Paper Submittals (When electronic submittals are impracticable): Place a permanent label or title block on each paper copy submittal item for identification.
    - a. Indicate name of firm or entity that prepared each submittal on label or title block.
    - b. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect or Construction Manager.
  - 3. Options: Identify options requiring selection by the Architect.
  - 4. Deviations: Identify deviations from the Contract Documents on submittals.
  - 5. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect or Construction Manager will return submittals, without review, received from sources other than Contractor.
  - 6. Resubmittals: Make resubmittals in same form and number of copies as initial submittal. Resubmit submittals until they are marked **"No Exceptions Taken"**, **"Note Markings"**, or **"Not Subject to Review."**
  - 7. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
  - 8. Use for Construction: Use only final submittals with mark indicating **"No Exceptions Taken"** or **"Note Markings"** taken by Architect.
- C. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
- 1. Submit electronic submittals via email as PDF electronic files. Architect or Construction Manager will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Submittals: Submit paper copies of each submittal, unless otherwise indicated. Architect or Construction Manager will return copies.
- D. Delegated-Design Services: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect or Construction Manager.
- E. Contractor's Review

1. Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect or Construction Manager.
2. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

F. Architect's Action

1. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
2. Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
  - a. Final Unrestricted Release: Where the submittal is marked "**No Exceptions Taken,**" the Work covered by the submittal may proceed provided it complies with the Contract Documents.
  - b. Final-but-Restricted Release: Where the submittal is marked "**Note Markings,**" the Work covered by the submittal may proceed provided it complies with both Architect's notations and corrections on the submittal and the Contract Documents.
  - c. Rejected: Where the submittal is marked "**Rejected,**" do not proceed with the Work covered by the submittal. Prepare a new submittal for a product that complies with the Contract Documents.
  - d. Returned for Resubmittal: Where the submittal is marked "**Revise and Resubmit,**" do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise or prepare a new submittal according to Architect's notations and corrections.
  - e. Other Action: If the submittal is primarily for information purposes, record purposes, special processing, or other contractor activity, the submittal will be returned marked "**Not Subject to Review.**"
  - f. Other Action: Where the submittal review comments are returned on a separate document than the Submittal, the Submittal is marked "**Comments Attached.**"
3. Partial or incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
4. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
5. Material Safety Data Sheets (MSDSs): MSDSs that are included with submittals will not be reviewed. The Architect's action with respect to submittals that include MSDSs will be limited to compliance of the material submittal with the Contract Documents and shall not extend to the MSDSs.

1.9 QUALITY REQUIREMENTS

A. Conflicting Requirements

1. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
2. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

**B. Reports and Documents**

1. Prepare and submit certified written reports specified in other Sections for the following:
  - a. Test and Inspection Reports.
  - b. Manufacturer's Technical Representative's Field Reports.
  - c. Factory-Authorized Service Representative's Reports.

**C. Quality Assurance**

1. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
2. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
3. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
4. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
5. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - a. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - b. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
6. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

7. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
8. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  - a. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.
  - b. Notify Architect or Construction Manager days in advance of dates and times when mockups will be constructed.
  - c. Employ workers that will be employed during the construction at the Project.
  - d. Demonstrate the proposed range of aesthetic effects and workmanship.
  - e. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
  - f. Allow days for initial review and each re-review of each mockup.
  - g. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - h. Demolish and remove mockups when directed, unless otherwise indicated.

D. Quality Control

1. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  - a. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
2. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
3. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in "Submittal Procedures" article.
4. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
5. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents using laboratory for retesting and reinspecting approved by Architect or Construction Manager

- E. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

- F. Test and Inspection Log: Prepare a record of tests and inspections. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's or Construction Manager's reference during normal working hours.
- G. Repair and Protection: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

#### 1.10 TEMPORARY FACILITIES AND CONTROLS

##### A. Quality Assurance

- 1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- 2. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

##### B. Materials

- 1. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts as required by authorities having jurisdiction.
- 2. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top rails.

##### C. Equipment

- 1. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- 2. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

##### D. Temporary Utility Installation

- 1. General: Install temporary service or connect to existing service. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- 2. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
- 3. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- 4. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- 5. Heating, Cooling, and Ventilation and Humidity Control: Provide temporary heating, cooling and ventilation and humidity control required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse

effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

6. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
7. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

E. Support Facilities Installation

1. Traffic Controls: Comply with requirements of authorities having jurisdiction.
2. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
3. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with "Execution" article for progress cleaning requirements.
4. Temporary Elevator Use: Use of elevators is not permitted.

F. Security and Protection Facilities Installation

1. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Comply with work restrictions specified in "Summary" article.
2. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
3. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
4. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
5. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
6. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
7. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

G. Moisture and Mold Control

1. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:



- a. Protect porous materials from water damage.
  - b. Protect stored and installed material from flowing or standing water.
  - c. Keep porous and organic materials from coming into prolonged contact with concrete.
  - d. Remove standing water from decks.
  - e. Keep deck openings covered or dammed.
2. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - a. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - b. Keep interior spaces reasonably clean and protected from water damage.
  - c. Periodically collect and remove waste containing cellulose or other organic matter.
  - d. Discard or replace water-damaged material.
  - e. Do not install material that is wet.
  - f. Discard, replace or clean stored or installed material that begins to grow mold.
  - g. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
3. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  - a. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  - b. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
- H. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

#### 1.11 PRODUCT REQUIREMENTS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  1. Architect's or Construction Manager's Action: If necessary, Architect or Construction Manager will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect or Construction Manager will notify Contractor of approval or rejection of proposed comparable product request within days of receipt of request, or days of receipt of additional information or documentation, whichever is later. Use product specified if Architect or Construction Manager does not issue a decision on use of a comparable product request within time allocated.



- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Article "Submittal Procedures." Show compliance with requirements.
- C. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- D. Product Delivery, Storage, and Handling: Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
  - 5. Store products to allow for inspection and measurement of quantity or counting of units.
  - 6. Store materials in a manner that will not endanger Project structure.
  - 7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 8. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  - 9. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  - 10. Protect stored products from damage and liquids from freezing.
  - 11. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.
- E. Product Warranties: Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- F. Product Selection Procedures: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation. Procedures defined below may or may not be included in the Work of this Project. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
  - 1. Product: Provide the named product that complies with requirements.
  - 2. Manufacturer: Provide a product by the named manufacturer that complies with requirements.
  - 3. Products: Provide one of the products listed that complies with requirements.
  - 4. Manufacturers: Provide a product by one of the manufacturers listed that complies with requirements.
  - 5. Basis-of-Design Product:

- a. Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Submit comparable products as specified "Substitution Procedures" article. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.
  - b. Where Specifications name a product, or refer to a product indicated on Drawings, but do not include a list of manufacturers, provide the specified product or a comparable product that is approved by substitution prior to date for receipt of Bids. Submit comparable products as specified in "Substitution Procedures" article. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named.
- G. Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Request is in the form of a substitution as Specified in "Substitution Procedures" article.
  3. Samples, if requested.

## 1.12 EXECUTION

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
  2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
  3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.
- C. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent

possible. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

- D. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
- E. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.
- F. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- G. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- H. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- I. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect or Construction Manager according to requirements in "Project Management and Coordination" article.
- J. Installation: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
  - 2. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
  - 3. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
  - 4. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - 5. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
  - 6. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

- K. Cutting and Patching: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
  - 1. Temporary Support: Provide temporary support of work to be cut.
  - 2. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- L. Progress Cleaning: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully. Maintain Project site free of waste materials and debris.
- M. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- N. Starting and Adjusting: Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest. Adjust equipment for proper operation. Adjust operating components for proper operation without binding. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- O. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Restore permanent facilities used during construction to their specified condition.

#### 1.13 OPERATION AND MAINTENANCE DATA

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system.
- B. Emergency Manuals: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
  - 1. Organize manual into a separate section for each of the following:
    - a. Type of emergency.
    - b. Emergency instructions.
    - c. Emergency procedures.
- C. Systems and Equipment Operation Manuals: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures. In addition to requirements in this Section, include operation data required in individual Specification Sections.
- D. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include

manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

- E. Product Maintenance Manuals: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds.

#### 1.14 PROJECT RECORD DOCUMENTS

- A. Closeout Submittals:

- 1. Record Drawings: Comply with the following:
    - a. Number of Copies: Submit PDF electronic files of scanned record prints and three sets of file prints
  - 2. Record Specifications: Submit three paper copies and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

- B. Record Drawings

- 1. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
  - 2. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings.

- C. Record Specifications: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

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

#### 1.15 DEMONSTRATION AND TRAINING

- A. Instruction Program: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

- 1. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 2. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES (Not Used)

3.2 SCHEDULE OF UNIT PRICES (Not Used)

3.3 SCHEDULE OF ALTERNATES (Not Used)

**CONSTRUCTION PHASE SUBSTITUTION REQUEST FORM    Page 1**

Project: \_\_\_\_\_ Substitution Request No. \_\_\_\_\_  
\_\_\_\_\_  
From: \_\_\_\_\_  
To: \_\_\_\_\_ Date: \_\_\_\_\_  
\_\_\_\_\_  
A/E Comm. No.: \_\_\_\_\_  
Re: \_\_\_\_\_ Contract For: \_\_\_\_\_

---

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_  
Section: \_\_\_\_\_ Page: \_\_\_\_\_ Article/Paragraph: \_\_\_\_\_

---

Proposed Substitution: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
Address: \_\_\_\_\_ Trade Name: \_\_\_\_\_  
\_\_\_\_\_ Model No.: \_\_\_\_\_

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Installer \_\_\_\_\_ Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
Address: \_\_\_\_\_ Trade Name: \_\_\_\_\_

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☐ Point-by-point comparative data attached – REQUIRED BY A/E

Reason for not providing specified item

\_\_\_\_\_

\_\_\_\_\_

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Similar Installation:

Project: \_\_\_\_\_ Architect: \_\_\_\_\_ Fax: \_\_\_\_\_  
Address: \_\_\_\_\_ Owner: \_\_\_\_\_  
\_\_\_\_\_ Date Installed: \_\_\_\_\_

Proposed substitution affects other parts of work    ☐ No    ☐ Yes; explain

\_\_\_\_\_

\_\_\_\_\_

---

Savings to Owner for accepting Substitution: \_\_\_\_\_ (\$ \_\_\_\_\_)

Proposed substitution changes Contract Time:    ☐ No    ☐ Yes    \_\_\_\_\_ days

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Supporting Data Attached    ☐ Drawings    ☐ Product Data    ☐ Samples    ☐ Tests    ☐ Reports    ☐

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## CONSTRUCTION PHASE SUBSTITUTION REQUEST FORM

Page 2

- Attached Data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request: applicable portions of the data are clearly defined.
- Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies:

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

Submitted by: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Attachments: \_\_\_\_\_

### A/E'S REVIEW AND ACTION

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

Signed By: \_\_\_\_\_ Date: \_\_\_\_\_

Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**CONSTRUCTION PHASE SUBSTITUTION REQUEST FORM**

**Page 3**

Point by point Comparative Data: Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

|                       | Specified Item | Proposed Substitution |
|-----------------------|----------------|-----------------------|
| Product Name          |                |                       |
| Manufacturer          |                |                       |
| Applicable Standards  |                |                       |
|                       |                |                       |
| Approvals             |                |                       |
|                       |                |                       |
| Availability and Cost |                |                       |
|                       |                |                       |
| Warranty              |                |                       |
|                       |                |                       |
| Size                  |                |                       |
|                       |                |                       |
| Finish                |                |                       |
|                       |                |                       |
| Limitations           |                |                       |
|                       |                |                       |
| Maintenance           |                |                       |
|                       |                |                       |
| Other                 |                |                       |
|                       |                |                       |
|                       |                |                       |

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## SECTION 013126 – PROJECT COLLABORATION SOFTWARE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Collaboration software requirements.
  - 1. Utilize a web-based construction project management collaboration software such as Procore ([www.procore.com](http://www.procore.com)) to submit, track, distribute and collaborate on project documentation and action items.
  - 2. The intent of utilizing a web-based construction management application is to reduce cost and schedule risk, improve quality and safety, and maintain a healthy team dynamic by improving information flow, reducing non-productive activities, reducing rework and decreasing turnaround times.

#### 1.2 SOFTWARE CAPABILITIES

- A. Capabilities shall include but are not limited to:
  - 1. Daily Log
    - a. Provide daily log entry from web and mobile with automatic capture of daily weather conditions.
    - b. Provide ability to attach photographs to entries directly from mobile.
    - c. Provide reporting capabilities to easily report on man-hours and activities for a certain time frame and contractor.
  - 2. Dashboards
    - a. Provide a dashboard that shows the status of all currently assigned items with drill down capability to see the subject, assignee and due date of each item.
  - 3. Deficiency Tracking
    - a. Provide a means for recording, assigning and confirming completion of any deficiency or observation noted during the course of construction. Must be accessible from web and mobile
  - 4. Documents
    - a. Provide a storage location for miscellaneous project documents with the ability to have a folder hierarchy and privacy settings on folders.
    - b. There should not be a storage limit.
    - c. Provide download tracking.
    - d. Provide the ability to revision and check out files, with access to all previous revisions.

5. Drawings
  - a. Provide access to a system maintained current set of drawings on web and mobile, with access to all previous revisions as well.
  - b. Provide automatic hyperlinking capability for detail callouts.
  - c. Provide drawing markup capabilities on web and mobile.
  - d. Provide ability to link RFIs, Submittals, Punchlist Items, Photos and Project Documents to the drawings.
  - e. Drawing Markups should be carried forward when new revisions are uploaded.
  - f. Markups and linked documentation should be able to be public or private.
6. Inspections
  - a. Provide ability to create inspections from web and mobile.
  - b. Provide ability to create a deficiency item from an inspection that can be assigned and tracked to completion.
7. Meetings
  - a. Provide ability to create, edit and view meeting minutes from web and mobile.
  - b. Provide ability to create action items with assignees and due dates from a meeting item.
8. Mobile Accessibility
  - a. Provide native mobile applications for iOS and Android phones at a minimum that provide access to relevant project documentation, including as-built versions of Drawings and Specifications, even when there is no internet access.
9. Photos
  - a. Provide ability to upload and view photos from web and mobile.
  - b. Provide ability to markup photos from mobile to clarify anything important in the photo.
  - c. Provide ability to link photos to specific locations on drawings.
10. Punchlist
  - a. Provide ability to create punchlist items from web and mobile and link them to specific locations on the drawings.
  - b. Provide ability to distribute punchlist items to all contractors, for contractors to mark them as resolved with photographic proof of resolution via mobile, and for the items to be marked as complete via mobile or web. .
11. Requests for Information (RFIs)
  - a. Provide ability to create RFIs with assignees, due dates and attachments.
  - b. Provide ability for assignees to respond to RFIs both via the software and by responding to the system generated email.
  - c. Provide an auto-generated log of all RFIs.

12. Schedule

- a. Provide ability to display schedules from typical scheduling software such as Microsoft Project, Primavera P3, Primavera P6 or Asta Powerproject.

13. Specifications

- a. Provide ability to upload project specifications and manage them at the individual specification level.
- b. Provide ability to view and search specifications on web and mobile.
- c. Provide ability to upload revisions to individual specifications and maintain all revision history.
- d. Provide an auto-generated current specification log that provides access to the current version of each specification.
- e. Provide ability to link specifications to submittals and view the specification from the submittal.

14. Submittals

- a. Provide ability to upload a submittal register of all expected submittals.
- b. Provide ability to create multi-step approval workflows for submittals, with reminder notifications for the current assignee.
- c. Provide the ability to upload any file type without size restrictions.
- d. Provide an auto-generated submittal log.

1.3 TECHNOLOGY

- A. Fully web based with mobile apps for Windows, iOS and Android phones.
- B. Accessible without logging in through a virtual private network (VPN).
- C. Works on the current version of Internet Explorer, Google Chrome, Mozilla Firefox and Apple Safari browsers.
- D. Can generate emails automatically, and all attachments are included in the emails via download links to avoid emails not being delivered due to size.
- E. PDF output of forms such as RFIs, Submittals, Meetings, Change Orders, etc. should be available and customizable.

1.4 TRAINING AND SUPPORT

- A. The software selected must provide support to all parties via email, phone and live chat at no additional charge.
- B. The software selected must provide training in the form of self-paced learning videos as well as interactive webinars.

- C. The contractor shall hold a kickoff meeting with the Owner and applicable consultants at the beginning of the project to discuss how the software will be used, routing & naming protocols, etc.

## 1.5 PROCEDURES

### A. RFIs and Submittals

1. The Contractor will be responsible for submitting all RFIs and Submittals through the software and assigning them to the appropriate parties.
2. Architect, Engineers and Design Consultants are responsible for posting all responses to these items via the software, including all relevant attachments.
3. The Contractor will distribute responses to all affected subcontractors and confirm agreement with the response by closing the item.

### B. Construction Documentation

1. The Contractor will manage Drawings, Specifications and Documents in the software to ensure that the current version of all applicable construction documentation is available to the entire team via web and mobile.
2. The Contractor will ensure that all RFIs which modify the current drawings are posted to the drawings and available via web and mobile within 24 hours of the RFI being responded to.

- C. Contractor will record and distribute meeting minutes and action items via the software.

- D. Contractor will take daily site photos and make them publicly available.

### E. Punchlist

1. All punchlist items will be managed through the software.
2. Punchlist items will be created by the Contractor while walking with the Owner and applicable consultants.
3. It will be at the Owner's discretion whether or not Punchlist Items can be closed while a representative from the Owner or applicable consultant is not present.

### F. General

1. It is intended that the contractor will utilize the software for at least all functions identified in "Section B – Software Capabilities."

## 1.6 PRICING

- A. The Contractor's proposal shall be inclusive of all software and device costs.

- B. The software must allow for unlimited users to ensure that all parties have access to the system.



PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013126

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## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Refer to Division 01 "Sustainable Design Requirements" sections for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

#### 1.5 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1.
  - 1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements on Drawings

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

### 2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: As indicated on Drawings.
- B. Plain-Steel Welded-Wire Reinforcement: As indicated on Drawings.
- C. Deformed-Steel Welded-Wire Reinforcement: As indicated on Drawings.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

### 2.4 CONCRETE MATERIALS

- A. Cementitious Materials:
  - 1. Portland Cement: ASTM C 150/C 150M, Type I/II.
  - 2. Fly Ash: As indicated on Drawings.
  - 3. Slag Cement: As indicated on Drawings.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded, as indicated on Drawings.
  - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C 260/C 260M.
- D. Chemical Admixtures: As indicated on Drawings. Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
- E. Water: ASTM C 94/C 94M and potable.

## 2.5 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class A, with a permeance of 0.01 or lower per ASTM E 96 and 15 mil minimum thickness. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products:

- a. Fortifiber Corporation; Moistop Ultra 15.
- b. ISI Building Products; Viper VaporCheck II, 15 mil.
- c. Meadows, W. R., Inc.; Perminator 15 mil
- d. Raven Industries Inc.; Vapor Block 15.
- e. Reef Industries, Inc.; Griffolyn 15 mil.

## 2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

- B. Curing Compound: Provide one of the following for floor slabs to receive floor covering:

1. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.
2. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

- C. Curing and Sealing Compound: Provide the following for floor slab receiving no floor covering:

Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

## 2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

## 2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

- C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

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

## 2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Concrete Unless Noted Otherwise: As indicated on Drawings.
- B. Concrete for Interior Floor Slabs: As indicated on Drawings.
- C. Concrete for Exterior Flat Work: As indicated on Drawings.
- D. Concrete for Foundation Walls and Retaining Walls with Exterior Exposure: As indicated on Drawings.
- E. Concrete for Footings: As indicated on Drawings.

## 2.10 FABRICATING REINFORCEMENT

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

# PART 3 - EXECUTION

## 3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete as indicated on Drawings.

## 3.2 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  1. Lap joints 6 inches and seal with manufacturer's recommended tape.
  2. Seal vapor retarder to foundation perimeter to enhance performance of radon system.

### 3.3 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  - 1. Install steel reinforcement as indicated on Drawings.
  - 2. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: As indicated on Drawings.

### 3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

### 3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
- C. Grout-Cleaned Finish (Sack-Rubbed): Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into



voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

1. Apply to concrete surfaces exposed to public view.

- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.7 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Trowel Finish: As indicated on Drawings.
- C. Broom Finish: As indicated on Drawings.

### 3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Cure concrete according to ACI 308.1, by one of the following methods:
  1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  2. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

**3.9 CONCRETE SURFACE REPAIRS**

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

**3.10 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports as indicated on Drawings.

END OF SECTION 033000

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## SECTION 033543 - POLISHED CONCRETE FINISHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Polished concrete finishing, including staining and scoring.

#### 1.2 ACTION SUBMITTALS

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

##### B. Samples: For each type of product requiring color selection.

### PART 2 - PRODUCTS

#### 2.1 STAIN MATERIALS

##### A. Penetrating Stain: Water-based, acrylic latex, penetrating stain with colorfast pigments.

1. AmeriPolish
2. H&C Decorative Concrete Products, a brand of Sherwin-Williams Co.
3. Prosoco

#### 2.2 LIQUID FLOOR TREATMENTS

##### A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

1. AmeriPolish
2. H&C Decorative Concrete Products, a brand of Sherwin-Williams Co.
3. Prosoco

### PART 3 - EXECUTION

#### 3.1 POLISHING

##### A. Polish: Level 2: Low sheen, 400 grit (base bid); Level 3: High sheen, 800 grit (as add alternate)

##### B. Apply polished concrete finish system to cured and prepared slabs.

1. Machine grind floor surfaces to receive polished finishes level and smooth.
2. Apply reactive stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
3. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
4. Apply penetrating stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
5. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
6. Control and dispose of waste products produced by grinding and polishing operations.
7. Neutralize and clean polished floor surfaces.

### 3.2 STAINING

- A. Newly placed concrete to be at least 30 days old before staining.
- B. Prepare surfaces according to manufacturer's written instructions and as follows:
  1. Clean concrete thoroughly by scraping, applying solvents or stripping agents, sweeping and pressure washing, or scrubbing with a rotary floor machine and detergents recommended by stain manufacturer. Rinse until water is clear and allow surface to dry.
    - a. Do not use acidic solutions to clean surfaces.
  2. Test surfaces with droplets of water. If water beads and does not penetrate surface, or penetrates only in some areas, profile surfaces by grinding, sanding, or abrasive blasting. Retest and continue profiling surface until water droplets immediately darken and uniformly penetrate concrete surfaces.
- C. Allow concrete surface to dry before applying stain. Verify readiness of concrete to receive stain according to ASTM D4263 by tightly taping 18-by-18-inch (450-by-450-mm), 4-mil- (0.1-mm-) thick polyethylene sheet to a representative area of concrete surface. Apply stain only if no evidence of moisture has accumulated under sheet after 16 hours.
- D. Reactive Stain: Apply reactive stain to concrete surfaces according to manufacturer's written instructions and as follows:
  1. Apply stain by uncolored bristle brush, roller, or high-volume, low-pressure sprayer and immediately scrub into concrete surface with uncolored, acid-resistant nylon-bristle brushes in continuous, circular motion. Do not spread stain after fizzing stops. Allow to dry four hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
  2. Remove stain residue after four hours by wet scrubbing with commercial-grade detergent recommended by stain manufacturer. Rinse until water is clear. Control, collect, and legally dispose of runoff.
- E. Penetrating Stain: Apply penetrating stain to concrete surfaces according to manufacturer's written instructions and as follows:

1. Apply first coat of stain to dry, clean surfaces by airless sprayer or by high-volume, low-pressure sprayer.
2. Allow to dry four hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
3. Rinse until water is clear. Control, collect, and legally dispose of runoff.

END OF SECTION 033543

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## SECTION 035413 - GYPSUM CEMENT UNDERLAYMENT

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes: Gypsum-cement-based, self-leveling underlayment for application below interior floor coverings.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 SUBMITTALS

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

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer (applicator) who is acceptable to manufacturer, who has completed gypsum-cement-based underlayment applications similar in material and extent to that required for this Project, and whose work has resulted in construction with a record of successful in-service performance.
- A. Fire-Resistance Ratings: Where indicated, provide gypsum-cement underlayment systems identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- B. Sound Transmission Characteristics: Where indicated, provide gypsum-cement underlayment systems identical to those of assemblies tested for STC and IIC ratings per ASTM E 90 and ASTM E 492 by a qualified testing agency.

#### 1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

#### 1.5 COORDINATION

- A. Coordinate application of underlayment with requirements of floor-covering products and adhesives, specified in Division 09 Sections, to ensure compatibility of products.



## PART 2 - PRODUCTS

### 2.1 PRODUCTS AND MATERIALS

- A. Source Limitations: Obtain gypsum-cement underlayment systems from a single source manufacturer.
- B. Underlayment: Gypsum cement, self-leveling product that can be applied in uniform thicknesses from 1 inch and that can be feathered at edges to match adjacent floor elevations.
  - a. Basis of Design: Subject to compliance with requirements, provide **Formulated Materials; 'Treadstone™ 'FR25'** or an equivalent approved by Architect from one of the following:
    - b. Hacker Industries, Inc.
    - c. Maxxon Corporation
    - d. USG Corporation; Levelrock
  - 2. Compressive Strength: Not less than **2500 psi** at 28 days when tested according to ASTM C 109.
  - 3. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C 219.
  - 4. Thickness: As indicated in drawings
- C. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- E. Sound Mat:
  - 1. Basis of Design: Subject to compliance with requirements, provide **Formulated Materials; 'Treadstone® 'Elite'** 1/4" sound reduction mat or an equivalent approved by Architect from one of the following:
    - a. Hacker Industries, Inc.
    - b. Maxxon Corporation.
    - c. USG Corporation
  - 2. Perimeter isolation: Provide manufacturer's standard isolation strips.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance. Proceed with application only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions for substrate indicated. Provide clean, dry, neutral-pH substrate for underlayment application.
  - 1. Treat nonmoving substrate cracks to prevent cracks from telegraphing (reflecting) through underlayment according to manufacturer's written recommendations.
  - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.
- C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

### 3.3 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
  - 1. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
  - 2. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Sound Mat: Install sound reduction mat according to manufacturer's written instructions.
  - 1. Do not use mechanical fasteners.
  - 2. Install perimeter isolation strips prior to applying underlayment.
- D. Apply underlayment to produce uniform, level surface.
  - 1. Apply a final layer without aggregate if required to produce smooth surface.
  - 2. Feather edges to match adjacent floor elevations.
- E. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- F. Do not install finish flooring over underlayment until after time period recommended by underlayment manufacturer.
- G. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

### 3.4 FIELD QUALITY CONTROL

- A. Field Samples: Take at least three molded-cube samples from each underlayment batch. Test samples according to ASTM C 109/C 109M for compliance with compressive-strength requirements. When requested, provide test results to Architect.

### 3.5 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 035413

## SECTION 042000 - UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes:

1. Concrete masonry units (CMUs).
2. Clay face brick.
3. Mortar and grout.
4. Masonry joint reinforcement.
5. Ties and anchors.
6. Embedded flashing.
7. Miscellaneous masonry accessories.
8. Cavity-wall insulation.

- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
- C. Samples for Verification: For each type and color of exposed masonry unit and colored mortar.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include data on material properties and material test reports substantiating compliance with requirements if required by authorities having jurisdiction.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
  2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

## 1.4 QUALITY ASSURANCE

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 010000 "General Requirements" for mockups.
  - 1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 60 inches long by 48 inches high.
- C. Mockups: Build integrated exterior mockup as specified in Section 010000 - "General Requirements" to demonstrate aesthetic effects and set quality standards for materials and execution.

## 1.5 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry with performance requirements as indicated on the Drawings.

## 2.2 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide shapes indicated and as follows:
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edge units for outside corners, unless otherwise indicated.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
  - 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of test specimen.
- C. Concrete Masonry Units: As indicated on Drawings.

## 2.3 BRICK

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
  - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
  - 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Clay Face Brick: Facing brick complying with ASTM C216.
  - 1. Basis of Design: As indicated on Drawings
  - 2. Grade: SW.
  - 3. Type: FBS.
  - 4. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
  - 5. Size: Modular.

## 2.4 CONCRETE AND MASONRY LINTELS

- A. Concrete Lintels: Precast units made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcing bars indicated to support loads indicated. Cure precast lintels by same method used for concrete masonry units.
- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout.

## 2.5 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: Requirements as indicated on Drawings.
  - 1. Products:
    - a. Cemex S.A.B. de C.V; Richmortar.
    - b. Lehigh Hanson; HeidelbergCement Group; Lehigh Masonry Cement.
    - c. The Quikrete Companies; Mason Mix.
    - d. SPEC MIX, Inc. Spec Mix Masonry Cement.
  - 2. Color Products:
    - a. Cemex S.A.B. de C.V; Richcolor Masonry Cement.
    - b. Lehigh Hanson; HeidelbergCement Group; Lehigh Custom Color Masonry Cement.
    - c. The Quikrete Companies; Mason Mix - Color.
    - d. SPEC MIX, Inc. Spec Mix Masonry Cement - Color.
- B. Aggregate for Mortar and Grout: Requirements as indicated on Drawings.
- C. Mortar Colors: As selected by Architect from manufacturer's full range.
- D. Water: Potable.

## 2.6 REINFORCEMENT

- A. Masonry Joint Reinforcement: ASTM A 951 and as indicated on Drawings.

## 2.7 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.
  - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
  - 2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Individual Wire Ties: 3/16-inch-diameter, hot-dip galvanized steel wire units with closed ends and not less than 4 inches wide. Use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
- D. Adjustable Masonry-Veneer Anchors

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
  - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
  - a. Fabricate sheet metal anchor sections and other sheet metal parts from 0.067-inch-thick, steel sheet, galvanized after fabrication.
  - b. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.188-inch-diameter, hot-dip galvanized steel wire.
  - c. Products:
    - 1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213.
    - 2) Hohmann & Barnard, Inc.; DW-10.
    - 3) Wire-Bond; RJ-711
3. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint.
  - a. Fabricate sheet metal anchor sections and other sheet metal parts from 0.067-inch-thick, steel sheet, galvanized after fabrication.
  - b. Fabricate wire connector sections from 0.188-inch-diameter, hot-dip galvanized, carbon -steel wire.
  - c. Products:
    - 1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213S.
    - 2) Hohmann & Barnard, Inc.; DW-10-X-Seismicclip.
    - 3) Wire-Bond; RJ-711 with Wire-Bond clip.
4. Polymer-Coated Steel or Stainless-Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, Polymer-coated steel drill screw to also comply with ASTM B 117.

## 2.8 EMBEDDED FLASHING MATERIALS

- A. Flexible Flashing: For flashing not exposed to the exterior, use the following, unless otherwise indicated:
  1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
    - a. Products:



- 1) Advanced Building Products Inc.; Peel-N-Seal.
- 2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
- 3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier-44.
- 4) Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
- 5) Hohmann & Barnard, Inc.; Textroflash.
- 6) Polyguard Products, Inc.; Polyguard 300.
- 7) Polytite Manufacturing Corp.; Poly-Barrier Self-Adhering Wall Flashing.

- B. Metal Drip Edges: Fabricate from stainless steel, ASTM A 240/A 240M, Type 304, 0.016 inch thick. Extend at least 3 inches into wall. Bend down outer edge 30 degrees to project 1/2 inch out from wall.

## 2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.
- B. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. Products:
    - a. Advanced Building Products Inc.; Mortar Break.
    - b. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
    - c. Mortar Net USA, Ltd.; Mortar Net.
  2. Thickness: Match cavity thickness.

## 2.10 Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

### CAVITY WALL FLASHING/DRAINAGE SYSTEM

- A. General: At Contractor's option, provide proprietary all-inclusive flashing/drainage system.
- B. Cavity Wall Flashing/Drainage System: Proprietary system consisting of flashing, metal drip edge, termination bar, cavity drainage material, and weeps.
1. Product: Mortar Net USA, Ltd; TotalFlash.
  2. Flashing: 40 mil polymeric KEE polymer, reinforced, UV stable membrane.
  3. Mortar Collection Device/Weep Tabs: Recycled polyester material impregnated with UV protection, biocide to resist mold and flame retardant.

4. Drip Edge: 28 gauge, 0.014 inch (0.038 mm), type 304 stainless steel drip edge pre-attached to flashing.
5. Termination Bar: High strength corrosion resistance plastic with pre-drilled holes.

## 2.11 CAVITY-WALL INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, closed-cell product extruded with an integral skin.

## 2.12 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers:

- a. Diedrich Technologies, Inc.
- b. EaCo Chem, Inc.
- c. ProSoCo, Inc.

## 2.13 MORTAR AND GROUT MIXES

- A. General: Provide mortar and grout mixes as indicated on Drawings.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Install unit masonry as indicated on Drawings.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
- E. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602.

### 3.2 LAYING MASONRY WALLS

- A. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- B. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

### 3.3 MORTAR BEDDING AND JOINTING

- A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Set precast concrete trim units in full bed of mortar with full vertical joints.
  - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

### 3.4 CAVITY WALLS

- A. Bond wythes of cavity walls together using ties and anchors as indicated on Drawings.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Apply liquid-applied air barrier to cavity face of backup wythe as specified in Section 072726 "Fluid-Applied Membrane Air Barriers."
- D. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

### 3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
- B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners by using prefabricated L-shaped units.

### 3.6 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
  1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners.
  2. Space anchors as indicated.

### 3.7 CONTROL AND EXPANSION JOINTS

- A. General:
  1. Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
  2. Install control and expansion joint materials as indicated on Drawings.
- B. Provide horizontal, pressure-relieving joints beneath shelf angles supporting masonry by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.

### 3.8 LINTELS

- A. Install steel lintels where indicated with indicated bearing dimension.

### 3.9 FLASHING, WEEPS, AND CAVITY DRAINAGE

- A. General: Install embedded flashing and weeps in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows, unless otherwise indicated:
  1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
  2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.

3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
  4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
- C. Install vents in head joints in exterior wythes of first course of masonry immediately above embedded flashing and above flashing under brick sills, heads of openings, and other locations indicated on Drawings.
1. Install vents in head joints in exterior wythes at 24 inches o.c unless otherwise indicated.
- D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.
- E. Install cavity wall flashing/drainage system in accordance with manufacturer's installation instructions. Install system as required by Drawings for cavity wall drainage.

### 3.10 REPAIRING, POINTING, AND CLEANING

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

END OF SECTION 042000

## SECTION 047200 - CAST STONE MASONRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Trim units.
  - 2. Accessories.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
- C. Samples:
  - 1. For each color and texture of cast stone required, 4 inches (100 mm) square in size.
  - 2. For colored mortar.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Material test reports.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by CSI or APA or PCI for Group A, Category AT.

### PART 2 - PRODUCTS

#### 2.1 CAST STONE UNITS

- A. Cast Stone Units: Comply with ASTM C1364.

1. Units are manufactured using the manufacturer's selected method.
2. Trim units including items as indicated on Drawings.
- B. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
  1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
  2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
  3. Provide drips on projecting elements unless otherwise indicated.
- C. Cure Units as Follows:
  1. Cure units in enclosed, moist curing room at 95 percent relative humidity and temperature of **100 deg F (38 deg C)** for 12 hours or **70 deg F (21 deg C)** for 16 hours.
  2. Keep units damp and continue curing to comply with one of the following:
    - a. No fewer than five days at mean daily temperature of **70 deg F (21 deg C)** or above.
    - b. No fewer than seven days at mean daily temperature of **50 deg F (10 deg C)** or above.
- D. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- E. Colors and Textures: As selected by Architect from manufacturer's full range

## 2.2 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M, or ASTM A666.
- B. Dowels: **1/2-inch- (12-mm-)** diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M, or ASTM A666

## 2.3 MORTAR MIXES

- A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.
- B. Preblended dry mortar mix complying with ASTM C1714/C1714M and capable of producing mortar strength as indicated in ASTM C270.
  1. For setting mortar, use Type N.
  2. For pointing mortar, use Type N.
- C. Pigmented Mortar: Use colored cement product.

PART 3 - EXECUTION

3.1 SETTING CAST STONE IN MORTAR

- A. Set cast stone as indicated in TMS 604.

3.2 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. Set cast stone as indicated in TMS 604.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
  - 1. Clean cast stone by methods described in Cast Stone Institute Technical Bulletin #39.

END OF SECTION 047200



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SECTION 051200 - STRUCTURAL STEEL FRAMING - **NOT YET EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shear stud connectors, shop welded.
3. Shrinkage-resistant grout.

B. Related Requirements:

Retain subparagraph below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
2. Section 053100 "Steel Decking" for field installation of shear stud connectors through deck.

1.2 DEFINITIONS

See the Evaluations for information about what items are and are not classified as structural steel in ANSI/AISC 303.

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** <Insert location>.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Anchor rods.
5. Threaded rods.
6. Forged-steel hardware.
7. Shop primer.

8. Galvanized-steel primer.
9. Etching cleaner.
10. Galvanized repair paint.
11. Shrinkage-resistant grout.

B. Sustainable Design Submittals:

1. [<Double click to insert sustainable design text for recycled content.>](#)
2. [<Double click to insert sustainable design text for EPDs and HPDs.>](#)
3. [<Double click here to insert sustainable design text for Health Product Declaration.>](#)
4. [<Double click here to insert sustainable design text for sourcing of raw materials.>](#)

C. Shop Drawings: Show fabrication of structural-steel components.

Retain "Delegated Design Submittal" Paragraph below if fabricator is responsible for design of structural-steel connections. Retain option in paragraph for jurisdictions that require deferred connection design to be signed and sealed by fabricator's qualified professional engineer.

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

## 1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

Coordinate first paragraph below with qualification requirements in Section 014000 "Quality Requirements."

- B. Mill test reports for structural-steel materials, including chemical and physical properties.

Retain "Source quality-control reports" Paragraph below if Contractor is responsible for source quality-control testing and inspecting.

- C. Source quality-control reports.
- D. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

Retain "Fabricator Qualifications" Paragraph below if certification or accreditation of fabricator is required. AISC's Category BU is for steel building structures; other categories in fabricator certification program are for bridges. Before retaining, verify availability of fabricators with IAS accreditation in Project area.

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

Retain "Installer Qualifications" Paragraph below if AISC certification of Erector is required. Verify availability of certified erectors. Retain category from two options below: ACSE for advanced certified steel erectors, CSE for certified steel erectors.

- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, [**Category ACSE**] [**Category CSE**].

Retain "Welding Qualifications" Paragraph below if shop or field welding is required. If retaining, also retain "Welding certificates" Paragraph in "Informational Submittals" Article.

- C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

## PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:

Retain references in subparagraphs below if applicable. Insert others to suit Project.

1. ANSI/AISC 303.
2. ANSI/AISC 360.
3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

- B. Connection Design Information:

Retain one or more of first four subparagraphs below. If more than one subparagraph is applicable, distinguish connections that belong to each subparagraph on the Drawings. Connection design practices among structural engineers vary nationwide; subparagraphs below are alternatives recognized by ANSI/AISC 303.

Retain "Option 1" Subparagraph below if the completed connection designs are shown on the Drawings.

1. Option 1: Connection designs have been completed and connections indicated on the Drawings.

Retain "Option 2" Subparagraph below if the fabricator is responsible for selecting and completing each connection.

2. Option 2: Fabricator's experienced steel detailer selects or completes connections in accordance with ANSI/AISC 303.
  - a. Select and complete connections using [schematic details indicated] [and] [ANSI/AISC 360] <Insert source>.
  - b. Use [Load and Resistance Factor Design; data are given at factored-load level] [Allowable Stress Design; data are given at service-load level].

Retain "Option 3 and 3A" Subparagraph below if connection design is delegated to fabricator's qualified professional engineer and member reinforcement at connections is shown on the Drawings.

3. Option 3 and 3A: Design connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer. Member reinforcement at connections is indicated on Drawings.
  - a. Use [Load and Resistance Factor Design; data are given at factored-load level] [Allowable Stress Design; data are given at service-load level].

Retain "Option 3 and 3B" Subparagraph below if connection design and final configuration of member reinforcement at connections is delegated to fabricator's qualified professional engineer.

4. Option 3 and 3B: Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
  - a. Use [Load and Resistance Factor Design; data are given at factored-load level] [Allowable Stress Design; data are given at service-load level].

C. Moment Connections: [Type PR, partially] [Type FR, fully] restrained.

D. Construction: [Moment frame] [Braced frame] [Shear wall system] [Combined system of moment frame and braced frame] [Combined system of moment frame and shear walls] [Combined system of braced frame and shear walls] [Combined system of moment frame, braced frame, and shear walls].

## 2.2 STRUCTURAL-STEEL MATERIALS

A. [<Double click to insert sustainable design text for recycled content.>](#)

B. W-Shapes: [ASTM A992/A992M] [ASTM A572/A572M, **Grade 50 (Grade 345)**].

C. Channels, Angles[, M-Shapes] [, S-Shapes]: [ASTM A36/A36M] [ASTM A572/A572M, **Grade 50 (Grade 345)**].

D. Plate and Bar: [ASTM A36/A36M] [ASTM A572/A572M, **Grade 50 (Grade 345)**].

E. Cold-Formed Hollow Structural Sections: [ASTM A500/A500M, **Grade B**] [ASTM A500/A500M, **Grade C**] structural tubing.

F. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.

- G. Welding Electrodes: Comply with AWS requirements.

## 2.3 BOLTS AND CONNECTORS

If using more than one description and grade of high-strength bolt in this article, indicate location of each on Drawings.

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, **Grade A325 (Grade A325M)**, Type 1, heavy-hex steel structural bolts; **ASTM A563, Grade DH (ASTM A563M, Class 10S)**, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

Retain "Direct-Tension Indicators" Subparagraph below if applicable.

1. Direct-Tension Indicators: ASTM F959/F959M, **Type 325-1 (Type 8.8-1)**, compressible-washer type with plain finish.
- B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125/F3125M, **Grade A490 (Grade A490M)**, Type 1, heavy-hex steel structural bolts[ **or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends**]; **ASTM A563, Grade DH (ASTM A563M, Class 10S)**, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

Retain "Direct-Tension Indicators" Subparagraph below if applicable.

1. Direct-Tension Indicators: ASTM F959/F959M, **Type 490-1 (Type 10.9-1)**, compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, **Grade A325 (Grade A325M)**, Type 1, heavy-hex steel structural bolts; **ASTM A563, Grade DH (ASTM A563M, Class 10S)**, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
  1. Finish: **[Hot-dip zinc coating] [Mechanically deposited zinc coating] [Hot-dip or mechanically deposited zinc coating]**.
  2. Direct-Tension Indicators: ASTM F959/F959M, **Type 325-1 (Type 8.8-1)**, compressible-washer type with **[mechanically deposited zinc coating] [mechanically deposited zinc coating, baked epoxy-coated]** finish.

Tension-control (twist-off) bolt assemblies in "Tension-Control, High-Strength Bolt-Nut-Washer Assemblies" Paragraph below correspond to strength of ASTM F3125/F3125M, Grade A325 (Grade A325M) bolts.

- D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, **[heavy-hex] [round]** head assemblies, consisting of steel structural bolts with splined ends; **ASTM A563, Grade DH (ASTM A563M, Class 10S)**, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
1. Finish: **[Plain] [Mechanically deposited zinc coating]**.

Retain "Shear Stud Connectors" Paragraph below if shop welding of shear studs to steel framing is required.

- E. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

## 2.4 RODS

Retain appropriate materials in "Unheaded Anchor Rods" Paragraph below or revise if other materials are required. AISC uses the generic term "anchor rods" to include unheaded rods and headed bolts and notes that "ASTM F1554 is the preferred material specification for anchor rods." Verify availability of ASTM F1554, Grade 55, weldable, before specifying.

- A. Unheaded Anchor Rods: [ASTM F1554, Grade 36] [ASTM F1554, Grade 55, weldable].
  - 1. Configuration: [Straight] [Hooked].
  - 2. Finish: [Plain] [Hot-dip zinc coating, ASTM A153/A153M, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].

Retain appropriate materials in "Headed Anchor Rods" Paragraph below or revise if other materials are required. AISC uses the generic term "anchor rods" to include unheaded rods and headed bolts and notes that "ASTM F1554 is the preferred material specification for anchor rods." Verify availability of ASTM F1554, Grade 55, weldable, before specifying.

- B. Headed Anchor Rods: [ASTM F1554, Grade 36] [ASTM F1554, Grade 55, weldable], straight.
  - 1. Finish: [Plain] [Hot-dip zinc coating, ASTM A153/A153M, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].
- C. Threaded Rods: [ASTM A36/A36M] [ASTM A193/A193M, Grade B7].
  - 1. Finish: [Plain] [Hot-dip zinc coating, ASTM A153/A153M, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].

## 2.5 FORGED-STEEL STRUCTURAL HARDWARE

- A. [Clevises] [and] [Turnbuckles]: Made from cold-finished carbon-steel bars, ASTM A108, AISI C-1035.

## 2.6 PRIMER

- A. Steel Primer:

Retain one of three subparagraphs below. Insert proprietary primers if required as part of special coating or painting system. Coordinate primer selection with surface preparation and topcoats, requirements for slip-critical joints, and limitations of sprayed fire-resistive materials. Insert color if required.

1. Comply with [Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."] [Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."]

Primer in first subparagraph below requires SSPC-SP 6 (WAB)/NACE WAB-3 commercial blast-cleaning surface preparation or better and 24 hours' drying before recoating. SSPC recommends two primer coats before exposing steel to exterior, and one or two topcoats.

2. SSPC-Paint 23, latex primer.

Fabricator's standard primer below requires SSPC-SP 2 surface preparation or better and usually provides minimal protection.

3. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

Retain "Galvanized-Steel Primer" Paragraph below for painted, hot-dip galvanized structural steel.

- B. Galvanized-Steel Primer: [MPI#26] [MPI#80,] [MPI#134].

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: [MPI#18, MPI#19, or SSPC-Paint 20] [ASTM A780/A780M].

## 2.7 SHRINKAGE-RESISTANT GROUT

Shrinkage-resistant grouts in "Metallic, Shrinkage-Resistant Grout" and "Nonmetallic, Shrinkage-Resistant Grout" paragraphs below have high compressive strength. For critical installations, require grout manufacturer to provide field assistance to Contractor. Retain first paragraph for heavy-duty grouting applications. Do not use in wet areas or on exterior.

- A. Metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

Retain "Nonmetallic, Shrinkage-Resistant Grout" Paragraph below for grouting applications where nonstaining grout is required.

- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.8 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

Retain "Shear Stud Connectors" Paragraph below if shear connectors are shop installed to structural steel.



- B. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

## 2.9 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

RCSC requires that joint types be specified in the Contract Documents for most loading conditions. See the Evaluations for a discussion of the joint types in "Joint Type" Subparagraph below, which are the three types RCSC now recognizes. Insert particular bolt-pretensioning method for pretensioned or slip-critical joints if required; RCSC states that each type can provide satisfactory results.

- 1. Joint Type: [Snug tightened] [Pretensioned] [Slip critical].
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

## 2.10 GALVANIZING

Retain this article if galvanizing of structural steel is required.

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
  - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

## 2.11 SHOP PRIMING

Retain this article if shop priming is required.

- A. Shop prime steel surfaces, except the following:

Retain, revise, or delete any of six subparagraphs below to suit Project.

- 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
  - 2. Surfaces to be field welded.
  - 3. Surfaces of high-strength bolted, slip-critical connections.
  - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  - 5. Galvanized surfaces [unless indicated to be painted].
  - 6. Surfaces enclosed in interior construction.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

Retain surface-preparation standards in four subparagraphs below or revise to suit Project. Subparagraphs are listed from least to most comprehensive surface preparation and from lowest to highest cost. Coordinate minimum surface-preparation requirements with selection of primers, paint, and coating systems.

"SSPC-SP 2" and "SSPC-SP 3" subparagraphs below require complete removal of loose rust, mill scale, and paint. SSPC-SP 2 is minimum surface preparation accepted by AISC for painted steel.

1. SSPC-SP 2.
2. SSPC-SP 3.

"SSPC-SP 7 (WAB)/NACE WAB-4" Subparagraph below permits tight residues of rust, mill scale, and coatings to remain.

3. SSPC-SP 7 (WAB)/NACE WAB-4.

"SSPC-SP 6 (WAB)/NACE WAB-3" Subparagraph below requires that two-thirds of surface area be free of visible residue.

4. SSPC-SP 6 (WAB)/NACE WAB-3.

Retain "Surface Preparation of Galvanized Steel" Subparagraph below if galvanized steel is to be shop primed.

- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner [**or in accordance with SSPC-SP 16**].
- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of **1.5 mils (0.038 mm)**. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

## 2.12 SOURCE QUALITY CONTROL

Retain this article if fabricator's shop testing is required and revise to suit local practices and requirements of authorities having jurisdiction. Consider deleting article if requiring AISC-certified fabricators and if authorities having jurisdiction approve fabrication work without special inspections. Coordinate with "Fabricator Qualifications" Paragraph in "Quality Assurance" Article.

Retain "Testing Agency" Paragraph below if required. Independent certification may be acceptable to authorities having jurisdiction without further monitoring of plant's quality-control and testing program by Owner.

- A. Testing Agency: [**Owner will engage**] [**Engage**] a qualified testing agency to perform shop tests and inspections.
  1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

RCSC prescribes inspection for snug-tightened joints and testing and inspection for each method of pretensioning joints.

2. Bolted Connections: Inspect[ **and test**] shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

Retain applicable nondestructive testing methods in "Liquid Penetrant Inspection," "Magnetic Particle Inspection," "Ultrasonic Inspection," and "Radiographic Inspection" subparagraphs below. Revise to indicate extent of weld inspections if applicable and to insert alternative acceptance criteria to AWS D1.1/D1.1M if required.

- a. Liquid Penetrant Inspection: ASTM E165/E165M.
- b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
- c. Ultrasonic Inspection: ASTM E164.
- d. Radiographic Inspection: ASTM E94/E94M.

Retain first subparagraph below if shop-welded shear stud connectors are required.

4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M.
5. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates [**Bearing Plates**] [**and**] [**Leveling Plates**]: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

Revise requirements in subparagraphs below to suit Project.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. [**Snug-tighten**] [**Pretension**] anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. [ **Comply with manufacturer's written installation instructions for grouting.** ]
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

### 3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

RCSC requires that joint types be specified in the Contract Documents for most loading conditions. See the Evaluations for a discussion of the joint types in "Joint Type" Subparagraph below, which are the three types RCSC recognizes. Insert particular bolt-pretensioning method for pretensioned or slip-critical joints if required; RCSC states that each type can provide satisfactory results.

1. Joint Type: [ **Snug tightened** ] [ **Pretensioned** ] [ **Slip critical** ].
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
  1. Verify structural-steel materials and inspect steel frame joint details.
  2. Verify weld materials and inspect welds.
  3. Verify connection materials and inspect high-strength bolted connections.

Retain "Testing Agency" Paragraph below, with or without "Special Inspections" Paragraph above, to identify who performs tests and inspections. If retaining second option in "Testing Agency" Paragraph, retain "Field quality-control reports" Paragraph in "Informational Submittals" Article.

- B. Testing Agency: [ **Owner will engage** ] [ **Engage** ] a qualified testing agency to perform tests and inspections.

RCSC prescribes inspection for snug-tightened joints and testing and inspection for each method of pretensioning joints.

1. Bolted Connections: Inspect[ **and test** ] bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.

Retain first subparagraph below if required.

- a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

Retain applicable nondestructive testing methods in "Liquid Penetrant Inspection," "Magnetic Particle Inspection," "Ultrasonic Inspection," and "Radiographic Inspection" subparagraphs below. Revise to indicate extent of weld inspections if applicable and to insert alternative acceptance criteria to AWS D1.1/D1.1M if required.

- 1) Liquid Penetrant Inspection: ASTM E165/E165M.
- 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
- 3) Ultrasonic Inspection: ASTM E164.
- 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 051200

## SECTION 054000 - COLD-FORMED METAL FRAMING

### 1.1 SUSTAINABILITY REQUIREMENTS

1. See Section 018113 SUSTAINABLE DESIGN REQUIREMENTS

### 1.2 QUALITY ASSURANCE

- A. Code-compliance certification of studs and tracks.

### 1.3 PERFORMANCE REQUIREMENTS

- A. **Delegated Design: For cold-formed steel framing.**

### 1.4 MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, with CP60 (AISI S240) metallic coating.
- B. Load-Bearing Wall Framing: Standard C-shaped, punched steel studs, steel box or back-to-back headers, and U-shaped, unpunched track.
  1. Minimum Steel Thickness: 0.0428 inch (1.09 mm)
- C. steel studs and U-shaped, unpunched track.
  1. Minimum Steel Thickness: 0.0428 inch (1.09 mm)
  2. Vertical deflection clips, Single deflection track, Double deflection track and Drift clips.
- D. Floor Joist Framing: Standard C-shaped, unpunched or punched steel joists and U-shaped, unpunched joist track.
  1. Minimum Steel Thickness: 0.0428 inch (1.09 mm)
- E. Roof Rafter Framing: Standard C-shaped steel sections.
  1. Minimum Steel Thickness: 0.0428 inch (1.09 mm)
- F. Ceiling Joist Framing: Standard C-shaped, unpunched or punched steel sections.
  1. Minimum Steel Thickness: 0.0428 inch (1.09 mm)
- G. Soffit Framing: Standard C-shaped, unpunched steel sections.
  1. Minimum Steel Thickness: 0.0428 inch (1.09 mm)

- H. Framing Accessories: Supplementary framing, Bracing, bridging, and solid blocking, Web stiffeners, Anchor clips, End clips, Foundation clips, Gusset plates, Stud kickers and knee braces, Joist hangers and end closures, Hole reinforcing plates, and backer plates.

## 1.5 INSTALLATION

- A. Fasten framing by welding or screw fastening.
  - 1. Load-Bearing Wall Stud Spacing: **16 inches (406 mm)** max.
  - 2. Exterior Non-Load-Bearing Wall Stud Spacing: **16 inches (406 mm)** max.
  - 3. Joist Spacing: **16 inches (406 mm)**

## 1.6 FIELD QUALITY CONTROL

- A. Testing: By Owner-engaged agency.

END OF SECTION 054000

## SECTION 055000 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Metal bollards
3. Metal ladders.
4. Elevator pit sump covers.

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

1. Loose steel lintels
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

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

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.

#### 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.



- C. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- D. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  - 1. Material: Cold-rolled steel, ASTM A1008/A1008M, commercial steel, Type B or structural steel, Grade 33; coated with rust-inhibitive, baked-on, acrylic enamel.

## 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.
- D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

## 2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099100 "Painting."
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## 2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches from ends and corners of units and 24 inches o.c.

## 2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Coordinate layout and fabrication of supports with Owner provided equipment.

## 2.7 METAL LADDERS

- A. General: For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
  - 1. Space siderails 16 inches apart unless otherwise indicated.
  - 2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
  - 3. Rungs: 3/4-inch-diameter steel bars.
  - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
  - 5. Provide nonslip surfaces on top of each rung.
  - 6. Prime ladders, including brackets and fasteners, with zinc-rich primer.

## 2.8 ELEVATOR PIT SUMP COVERS

- 2.9 Fabricate from 1/8-inch rolled-steel floor plate with four 1-inch-diameter holes for water drainage and for lifting.

## 2.10 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe steel shapes, as indicated.
- B. Prime steel bollards with zinc-rich primer

## 2.11 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

## 2.12 STEEL AND IRON FINISHES

- A. Shop prime iron and steel items indicated to be prime painted, unless they are to be embedded in sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with primers specified in Section 099100 "Painting" unless indicated.
- B. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
  - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Items Indicated to Receive Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

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

- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

### 3.2 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

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## SECTION 055113 - METAL PAN STAIRS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Preassembled steel stairs with concrete-filled treads.
2. Steel tube railings attached to metal stairs.
3. Steel tube handrails attached to walls adjacent to metal stairs.

B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

C. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.
4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.

D. Delegated-Design Submittal: For stairs and railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.2 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State in which Project is located.

B. Welding certificates.

#### 1.3 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs, and railings, including attachment to building construction.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Uniform Load: 100 lbf/sq. ft..
  - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
  - 3. Uniform and concentrated loads need not be assumed to act concurrently.
  - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
  - 5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- C. Structural Performance of Railings: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
    - b. Infill load and other loads need not be assumed to act concurrently.

### 2.2 METALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Tubing for Railings: ASTM A500/A500M (cold formed).
- C. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
- D. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

## 2.3 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

## 2.4 MISCELLANEOUS MATERIALS

- A. Handrail Wall Brackets: Cast nickel-silver, from face of wall.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

## 2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
  - 1. Join components by welding unless otherwise indicated.
  - 2. Use connections that maintain structural value of joined pieces.
- B. Assemble stairs and railings in shop to greatest extent possible.
  - 1. Disassemble units only as necessary for shipping and handling limitations.
  - 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
  - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
  - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.



- F. Weld connections to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. Weld exposed corners and seams continuously unless otherwise indicated.
  - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish # 3 - Partially dressed weld with spatter removed.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

## 2.6 FABRICATION OF STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Commercial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
  - 1. Fabricate stringers steel channels.
    - a. Provide closures for exposed ends of channel and rectangular tube stringers.
  - 2. Construct platforms of steel channel headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.
    - a. Provide closures for exposed ends of channel and rectangular tube framing.
- C. Metal Pan Stairs: Form risers, sub tread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.

## 2.7 FABRICATION OF STAIR RAILINGS

- A. Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.
  - 1. Rails and Posts: As indicated in Drawings.
  - 2. Mesh Infill: Welded-wire mesh crimped into 1-by-1/2-by-1/8-inch steel channel frames. Orient wire mesh with wires horizontal and vertical.
  - 3. Intermediate Rails Infill: As indicated in Drawings.
- B. Welded Connections: Fabricate railings with welded connections.
  - 1. Fabricate connections that are exposed to weather in a manner that excludes water.
  - 2. Cope components at connections to provide close fit, or use fittings designed for this purpose.
  - 3. Weld all around at connections, including at fittings.

4. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  5. Obtain fusion without undercut or overlap.
  6. Remove flux immediately.
  7. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 - Completely sanded joint, some undercutting and pinholes are okay as shown in NAAMM AMP 521.
- C. Form changes in direction of railings as follows:
1. As detailed.
- D. Close exposed ends of railing members with prefabricated end fittings.
- E. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- F. Connect posts to stair framing by direct welding unless otherwise indicated.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
  2. Provide ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
  3. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.
- H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports.
1. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.
- 2.8 FINISHES
- A. Finish metal stairs after assembly.
- B. Preparation for Shop Priming: Prepare uncoated, ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLING METAL PAN STAIRS

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- B. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- C. Fit exposed connections accurately together to form hairline joints.
  - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
  - 2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
  - 3. Comply with requirements for welding in "Fabrication, General" Article.
- D. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

### 3.2 INSTALLING RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
  - 1. Space posts at spacing indicated or, if not indicated, as required by design loads.
  - 2. Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet.
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed 1/4 inch in 12 feet.
  - 4. Secure posts and rail ends to building construction as follows:
    - a. Anchor posts to steel by welding to steel supporting members.
    - b. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post-installed anchors and bolts.
- B. Attach handrails to wall with wall brackets.
  - 1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
  - 2. Secure wall brackets to building construction as required to comply with performance requirements.

**3.3 REPAIR**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION 055113

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SECTION 055116 - METAL FLOOR PLATE STAIRS - **NOT YET FULLY EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Industrial Class stairs with steel floor plate treads.
2. Steel railings and guards attached to metal stairs.
3. Steel handrails attached to walls adjacent to metal stairs.

1.2 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

1.3 ACTION SUBMITTALS

A. Product Data: For metal floor plate stairs and the following:

1. Metal floor plate treads.
2. Shop primer products.
3. Grout.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.

[Retain subparagraph below if railings and guards are specified in this Section.](#)

4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the State in which Project is located.
- B. Welding certificates.

## 1.5 QUALITY ASSURANCE

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

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Stairs: Metal stairs withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
  - 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
  - 3. Uniform and concentrated loads need not be assumed to act concurrently.
  - 4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
  - 5. Limit deflection of treads, platforms, and framing members to L/360.
- B. Structural Performance of Railings and Guards: Railings and guards, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
    - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
    - b. Infill load and other loads need not be assumed to act concurrently.

### 2.2 METALS

Retain material types, qualities, and grades in remaining paragraphs below that are indicated in the Specifications or on Drawings. Insert or delete items to suit Project.

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
  - 1. <Double click to insert sustainable design text for recycled content.>

"Rolled-Steel Floor Plate" Paragraph below specifies minimum yield point of 30 ksi (205 MPa); revise if higher strength is required.

- B. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

1. [<Double click to insert sustainable design text for recycled content.>](#)

Retain "Steel Tubing for Railings and Guards" or "Steel Pipe for Railings and Guards" Paragraph below if steel railings and guards are specified in this Section. Typically, allow fabricator to use either type of tubing in first paragraph unless structural engineer of record has designed railings and guards based on one tube type. If higher strength is required, consider specifying ASTM A513/A513M Type 5 tubing or ASTM A513/A513M tubing of a high-strength alloy, after verifying availability.

- C. Steel Tubing for Railings and Guards: [ASTM A500/A500M (cold formed)] [or] [ASTM A513/A513M].

1. Provide galvanized finish for exterior installations and where indicated.

Primary difference between round steel tubing and steel pipe is in outside dimensions. Pipe sizes are normally indicated by use of NPS designator and weight class or schedule number; for tubing, OD and wall thickness are used. See Section 055213 "Pipe and Tube Railings."

Type, grade, and weight in "Steel Pipe for Railings and Guards" Paragraph below are typical default requirements; revise to suit Project.

- D. Steel Pipe for Railings and Guards: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

## 2.3 FASTENERS

- A. General: Provide [zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5] [Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5] where built into exterior walls.

1. Select fasteners for type, grade, and class required.

- B. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated and capable of withstanding design loads.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

## 2.4 MISCELLANEOUS MATERIALS

Retain one or more of "Shop Primers," "Universal Shop Primer," "Zinc-Rich Primer" and "Shop Primer for Galvanized Steel" paragraphs below. "Universal Shop Primer" Paragraph specifies a typical primer for painted finishes that provides minimum protection to steel. "Zinc-Rich Primer" and "Shop Primer for Galvanized Steel" paragraphs specify primers suitable for high-performance coatings.



- A. Shop Primers: Provide primers that comply with [Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."] [Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."]
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

In "Zinc-Rich Primer" Paragraph below, Type II, Level 2 is common.

- C. Zinc-Rich Primer: Comply with SSPC-Paint 20, [Type I-A] [Type I-B] [Type I-C] [Type II], Level [1] [2] [3], and compatible with topcoat.
- D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with [SSPC-Paint 20] [ASTM A780/A780M] and compatible with paints specified to be used over it.

Retain "Nonmetallic, Shrinkage-Resistant Grout" Paragraph below for stairs having stringers or supports with grouted baseplates.

- F. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for [interior] [exterior] use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

## 2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, railings, guards, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
  - 1. Join components by welding unless otherwise indicated.
  - 2. Use connections that maintain structural value of joined pieces.
- B. Assemble stairs[, **railings, and guards**] in shop to greatest extent possible.
  - 1. Disassemble units only as necessary for shipping and handling limitations.
  - 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
  - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated.
  - 2. Remove sharp or rough areas on exposed surfaces.

- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.

Delete first subparagraph below if appearance is not important or if economy is more important.

- 4. Weld exposed corners and seams continuously unless otherwise indicated.
  - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for **[Finish # 3 - Partially dressed weld with spatter removed]** **[Finish #4 - Good quality, uniform undressed weld with minimal splatter]**.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
  - 1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
  - 2. Locate joints where least conspicuous.
  - 3. Fabricate joints that will be exposed to weather in a manner to exclude water.
  - 4. Provide weep holes where water may accumulate internally.

## 2.6 FABRICATION OF STEEL-FRAMED STAIRS

NAAMM standard in "NAAMM Stair Standard" Paragraph below includes only minimal requirements.

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Industrial Class, unless more stringent requirements are indicated.
- B. Stair Framing:

Steel plate stringers are less expensive than channels, except for longer spans, and allow railing posts to be welded to face of stringer. Allowing plates or channels gives fabricator maximum flexibility.

- 1. Fabricate stringers of steel **[plates]** **[or]** **[channels]**.
  - a. Stringer Size: **[As required to comply with "Performance Requirements" Article]** **[As indicated on Drawings]**.
  - b. Provide closures for exposed ends of channel stringers.
  - c. Finish: **[Shop primed]** **[Painted]** **[Galvanized]**.
- 2. Construct platforms and tread supports of steel **[plate]** **[or]** **[channel]** headers and miscellaneous framing members as **[required to comply with "Performance Requirements" Article]** **[indicated on Drawings]**.

- a. Provide closures for exposed ends of channel framing.
  - b. Finish: [Shop primed] [Painted] [Galvanized].
- 3. Weld[ **or bolt**] stringers to headers; weld[ **or bolt**] framing members to stringers and headers.
- 4. Where stairs are enclosed by gypsum board[ **shaft-wall**] assemblies, provide hanger rods or struts to support landings from floor construction above or below.
  - a. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
- 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal Floor Plate Stairs: Form treads and platforms to configurations shown from rolled-steel floor plate of thickness [needed to comply with performance requirements, but not less than **1/4 inch (6.4 mm)**] [needed to comply with performance requirements, but not less than **3/16 inch (4.8 mm)**] [needed to comply with performance requirements, but not less than **1/8 inch (3.2 mm)**] [indicated on Drawings].

Retain one of first three subparagraphs below.

- 1. Form treads with integral nosing and back edge stiffener. Form risers of same material as treads.
- 2. Form treads with integral nosing and back edge stiffener. Form risers from steel sheet not less than **0.097 inch (2.5 mm)** thick, welded to tread nosings and stiffeners and to platforms.
- 3. Form treads with integral nosing and back edge stiffener and with open risers.
- 4. Weld steel supporting brackets to stringers and weld treads to brackets.
- 5. Fabricate platforms with integral nosings matching treads and weld to platform framing.

- D. Risers: Solid.

Retain "Toe Plates" Paragraph below if required for protection against objects falling over edge of traffic surfaces.

- E. Toe Plates: Provide toe plates around openings and at edge of open-sided floors and platforms, and at open ends and open back edges of treads.
  - 1. Material and Finish: Match treads and platforms.
  - 2. Fabricate to dimensions and details indicated.

## 2.7 FABRICATION OF STAIR RAILINGS AND GUARDS

- A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."
- B. Fabricate railings and guards to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.

1. Rails and Posts: 1-1/2-inch- (38-mm-) diameter round top and bottom rails and 1-1/2-inch- (38-mm-) square posts.
  2. Intermediate Rails Infill: 1-1/2-inch- (38-mm-) diameter round intermediate rails spaced less than 12 inches (305 mm) clear.
- C. Welded Connections: Fabricate railings and guards with welded connections.
1. Fabricate connections that are exposed to weather in a manner that excludes water.
    - a. Provide weep holes where water may accumulate internally.
  2. Cope components at connections to provide close fit, or use fittings designed for this purpose.
  3. Weld all around at connections, including at fittings.
  4. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  5. Obtain fusion without undercut or overlap.
  6. Remove flux immediately.
  7. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for **[Finish #3 - Partially dressed weld with spatter removed] [Finish #4 - Good quality, uniform undressed weld with minimal splatter]** as shown in NAAMM AMP 521.
- D. Form changes in direction of railings and guards as follows:
1. By bending.
- E. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required.
1. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- F. Close exposed ends of railing and guard members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- H. Connect posts to stair framing by direct welding unless otherwise indicated.
- I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.

Delete inapplicable requirements in subparagraphs below or revise to suit Project.

2. For galvanized railings and guards, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.

3. For nongalvanized railings and guards, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
  4. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.
- J. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports.
1. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

## 2.8 FINISHES

- A. Finish metal stairs after assembly.
- B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with [SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."] [SSPC-SP 3, "Power Tool Cleaning."] [minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:]

Retain first "Interior Stairs" Subparagraph below for stairs that are to receive zinc-rich primer or primer specified in Section 099600 "High-Performance Coatings."

1. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  2. Interior Stairs: SSPC-SP 3, "Power Tool Cleaning."
- D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF METAL STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
  - 1. Grouted Baseplates: Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces.
    - a. Clean bottom surface of baseplates.
    - b. Set steel stair baseplates on wedges, shims, or leveling nuts.
    - c. After stairs have been positioned and aligned, tighten anchor bolts.
    - d. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
    - e. Promptly pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
      - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
      - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints.
  - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
  - 2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
  - 3. Comply with requirements for welding in "Fabrication, General" Article.

### 3.2 INSTALLATION OF RAILINGS AND GUARDS

- A. Adjust railing and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
  - 1. Space posts at spacing indicated or, if not indicated, as required by design loads.
  - 2. Plumb posts in each direction, within a tolerance of **1/16 inch in 3 feet (2 mm in 1 m)**.
  - 3. Align rails and guards so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed **1/4 inch in 12 feet (6 mm in 3.5 m)**.
  - 4. Secure posts, rail ends, and guard ends to building construction as follows:
    - a. Anchor posts to steel by welding to steel supporting members.
    - b. Anchor handrail and guard ends to concrete and masonry with steel round flanges welded to rail and guard ends and anchored with post-installed anchors and bolts.
- B. Attach handrails to wall with wall brackets.

1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
2. Secure wall brackets to building construction as required to comply with performance requirements.

### 3.3 REPAIR

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

Retain "Touchup Painting" Paragraph below if touchup painting is specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in [Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."] [Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."]
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055116

## SECTION 055213 - PIPE AND TUBE RAILINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Steel railings.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data:
  - 1. Handrail brackets.
  - 2. Metal finishes.
  - 3. Paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

#### 1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
  - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."



## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.

### 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
  - 1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

### 2.3 STEEL RAILINGS

- A. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5.
- B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- C. Plates, Shapes, and Bars: ASTM A36/A36M.

### 2.4 FASTENERS

- A. Fastener Materials:
  - 1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941, Class Fe/Zn 5 for zinc coating.
- B. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.
  - 1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

## 2.5 MISCELLANEOUS MATERIALS

- A. Handrail Brackets: Cast iron or Cast nickel-silver, center of handrail 2-1/2 inches from wall.
- B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Intermediate Coats and Topcoats: Provide products that comply with Section 099100 "Painting."

## 2.6 FABRICATION

- A. Cut, drill, and punch metals cleanly and accurately.
  1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
  2. Remove sharp or rough areas on exposed surfaces.
- B. Form work true to line and level with accurate angles and surfaces.
- C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove flux immediately.
  4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 welds; good appearance, completely sanded joint, some undercutting and pinholes okay
- D. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- E. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- F. Form changes in direction as follows:
  1. As detailed.

2. By bending.
- G. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- H. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- I. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
  1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- K. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.
  1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
  2. Coordinate anchorage devices with supporting structure.

## 2.7 STEEL AND IRON FINISHES

- A. Galvanized Railings:
  1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
  2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
  3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner and as follows.
  1. Comply with SSPC-SP 16.
- D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, hot-dip galvanize anchors to be embedded in exterior concrete or masonry.
- E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3.

- F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
- G. Shop-Painted Finish: Comply with Section 09900 "Painting."
  - 1. Color: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.
  - 1. Fit exposed connections together to form tight, hairline joints.
  - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
  - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
  - 4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 5. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

### 3.2 ATTACHING RAILINGS

- A. Attach handrails to walls with wall brackets. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
- B. Flange mount roof guardrails to wood blocking at roof deck with lag bolts prior to roofing installation.
- C. Secure wall brackets to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.
  - 3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
- D. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

3.3 CLEANING

- A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.

END OF SECTION 055213

## SECTION 057300 - DECORATIVE METAL RAILINGS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Aluminum balcony railings.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of railings assembled from standard components.
2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, and attachment details.

C. Samples: For each type of exposed finish required.

D. Load Tests: Submit test results from ASTM E 935 conducted on the manufacturer's supplied system indicating compliance with required structural loading.

E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

F. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935.

B. Evaluation Reports: For post-installed anchors, from ICC-ES.

### PART 2 - PRODUCTS

#### 2.1 METALS, GENERAL

A. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

## 2.2 MATERIALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
  - 1. Extruded Bars and Shapes: ASTM B221, Alloy 6063-T5/T52.
  - 2. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6.
  - 3. Plate and Sheet: ASTM B209, Alloy 6061-T6.
  - 4. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.
  - 5. Castings: ASTM B26/B26M, Alloy A356.0-T6.

## 2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
    - b. Infill load and other loads need not be assumed to act concurrently.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics.
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval.

## 2.4 ALUMINUM DECORATIVE BALCONY RAILINGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Superior Aluminum Products, Inc. railings as identified on Drawings or a comparable product by one of the following:
  - 1. American Railworks ,LLC.
  - 2. ATR Technologies, Inc.

3. Greco, a CSW Industrials Company.
4. NW Aluminum.
5. Thompson Fabricating, LLC.

## 2.5 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
  1. Aluminum Components: Type 304 stainless-steel fasteners.
- B. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
  1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

## 2.6 MISCELLANEOUS MATERIALS

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## 2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Connections: Fabricate railings with welded connections unless otherwise indicated.
- C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  1. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds; no evidence of a welded joint.
- D. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- E. Close exposed ends of hollow railing members with prefabricated end fittings.
- F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

## 2.8 METAL FINISHES

- A. Powder-Coat Finish: AAMA 2604 except with a minimum dry film thickness of 1.5 mils.



1. Color: As selected by Architect from manufacturer's full range of standard colors.
2. Gloss: Semi-gloss

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  1. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
  1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout.
- E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.
- F. Anchor railing ends to concrete and masonry with brackets on underside of rails connected to railing ends and anchored to wall construction with anchors and bolts.
- G. Secure wall brackets and railing end flanges to building construction as follows:
  1. For solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  2. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
- H. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION 057300

## SECTION 061000 - ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Shear wall panels.
4. Wood blocking and nailers.
5. Wood furring.
6. Plywood backing panels.

- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

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

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

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

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Powder-actuated fasteners.
7. Expansion anchors.
8. Metal framing anchors.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.
- C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

### 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPAC U1; As indicated on Drawings, acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates. .
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings.

### 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant

progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. 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.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:

## 2.4 DIMENSION LUMBER FRAMING

- A. Framing Lumber: As indicated on Drawings.

## 2.5 ENGINEERED WOOD PRODUCTS

- A. Engineered Wood Products As indicated on Drawings.

## 2.6 SHEAR WALL PANELS

- A. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.7 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.
  4. Furring.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber of any species.

**2.8 PLYWOOD BACKING PANELS**

- A. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

**2.9 FASTENERS**

- A. General: Provide fasteners of size and type indicated on Drawings that comply with requirements specified in this article for material and manufacture.
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: As indicated on Drawings.

**2.10 METAL FRAMING ANCHORS**

- A. Metal Framing Anchors: As indicated on Drawings.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

**2.11 MISCELLANEOUS MATERIALS**

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

**PART 3 - EXECUTION****3.1 INSTALLATION, GENERAL**

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

### 3.2 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

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SECTION 061600 – SHEATHING – **NOT YET FULLY EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Composite Wall sheathing with integral weather barrier.
3. Roof sheathing.
4. Subflooring.
5. Underlayment.

B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

C. Refer to Section 010000 "General Requirements," Schedule of Alternates.

D. Related Sections:

1. 035413 "Gypsum Cement Underlayment".
2. 072100 "Thermal Insulation".
3. 072500 "Weather Barriers".
4. 075423 "Thermoplastic-Polyolefin (TPO) Roofing".

1.2 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory".



## 2.2 WOOD PANEL PRODUCTS

- A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- B. Oriented Strand Board: DOC PS 2.

## 2.3 WALL SHEATHING

- A. Plywood Sheathing, Walls: Where indicated on Drawings.
- B. Oriented-Strand-Board Sheathing, Walls: Where indicated on Drawings.
- C. Magnesium Oxide (MgO) Panels: Alternate to wood panel exterior wall sheathing where indicated on Drawings.
- D. Paper-Surfaced Gypsum Sheathing: ASTM C1396/C1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.
  - 1. Where indicated on Drawings.
  - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
- E. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.
  - 1. Where indicated on Drawings.
  - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
- F. Cellulose Fiber-Reinforced Gypsum Sheathing: ASTM C1278/C1278M, gypsum sheathing.
  - 1. Where indicated on Drawings.
  - 2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
- G. Cementitious Backer Units, Walls: ASTM C1325, Type A.
  - 1. Where indicated on Drawings.
  - 2. Thickness: As indicated.
- H. Extruded-Polystyrene-Foam Sheathing: ASTM C578, Type IV, in manufacturer's standard lengths and widths with tongue-and-groove or shiplap long edges as standard with manufacturer.
  - 1. Where indicated on Drawings.
  - 2. Thickness: As indicated.
  - 3. Flame Propagation Test: Materials and construction are to be tested in accordance with NFPA 285.
- I. Foil-Faced, Polyisocyanurate-Foam Sheathing: ASTM C1289, Type I or Type II, Class 2, rigid, cellular, polyisocyanurate thermal insulation. Foam-plastic core and facings are to have a flame-spread index of 25 or less when tested individually.
  - 1. Where indicated on Drawings.
  - 2. Thickness: As indicated.

3. Flame Propagation Test: Materials and construction are to be tested in accordance with NFPA 285.

## 2.4 COMBINATION WALL SHEATHING AND WEATHER BARRIER

- A. Oriented-Strand-Board Wall Sheathing: With integral water-resistive barrier, Exposure 1 sheathing.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; ZIP System Roof and Wall Sheathing or a substitution approved by Architect.
  2. Span Rating, Panel Grade and Performance Category: As indicated on Drawings
  3. Edge Profile: Self-spacing profile.
  4. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches and 24-inches on centers spacings.
  5. Performance Standard: DOC PS2-10 and ICC-ES ESR-1474.
  6. Factory laminated integral water-resistive barrier facer.
  7. Perm Rating of Integral Water-Resistive Barrier: 12-16 perms.
  8. Assembly maximum air leakage of 0.0072 cfm/sq. ft. infiltration and 0.0023 cfm/ sq. ft. exfiltration at a pressure differential of 1.57.
  9. Exposure Time: Designed to resist weather exposure for 180 days.

## 2.5 ROOF SHEATHING

- A. Roof Sheathing: As indicated on Drawings.

## 2.6 SUBFLOORING

- A. Structural Subfloor: As indicated on Drawings.

## 2.7 MOISTURE RESISTANT SUB-FLOOR

- A. Oriented-Strand Board Subfloor-Underlayment: Sheathing manufactured with moisture resistant resin impregnated wood strands that resist swelling, cupping, and flaking.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; AdvanTech Flooring or a comparable substitution approved by Architect.
  2. Span Rating and Performance Category: As indicated on Drawings.
  3. Edge Detail: Tongue and groove.
  4. Surface Finish: Fully sanded face.
  5. Performance Standard: DOC PS2-10 and ICC-ES ESR-1785.
  6. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches 19.2-inches and 24-inches on center spacings.

## 2.8 UNDERLAYMENT

- A. Plywood Underlayment for Flooring: Tongue and groove panels, DOC PS 1, Exterior A-C with fully sanded face or as approved by finish flooring manufacturer.
  - 1. Thickness: Minimum as required per fire rated tested assembly.
- B. Magnesium Oxide (MgO) Panels: Alternate to wood panel underlayment, or to gypsum cement underlayment specified in separate Section.

## 2.9 ACOUSTIC SLEEPERS

- A. Rubber Sleepers: Neoprene rubber sleeper for air-borne and structure-borne sound transmission mitigation.
  - 1. Product: Subject to compliance with requirements, provide STC Sound Control; STC Acoustic Sleepers or a comparable substitution subject to approval by the Architect.

## 2.10 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

## 2.11 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels and as indicated on Drawings.
- B. Adhesive for Underlayment: Approved for use with type of construction panel indicated by manufacturer of acoustic sleepers.
- C. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, proprietary seam tape consisting of polyolefin film with acrylic adhesive.
  - 1. Basis-of-Design Product: Subject to compliance with requirements provide Huber Engineered Woods; ZIP System Seam and Flashing Tape or a comparable substitution approved by Architect.
  - 2. Thickness: 0.012 inch, 3.75 inch, or 6 inch.
  - 3. Code Compliance: Comply with requirements of authorities having jurisdiction and ICC Evaluation Service, Inc. "AC148 - Acceptance Criteria for Flexible Flashing Materials."
  - 4. International Code Council (ICC), ICC-ES ESR2227 (ZIP System Tape).
  - 5. American Architectural Manufacturer's Association; AAMA 711.
- D. Miscellaneous Lumber:

1. Wood strip shim supports cut from wood panels, DOC PS 1 or PS 2, thickness to match the total thickness of acoustic sleepers and wood lath strips.
2. Wood Lath: No 3 grade strips, size as recommended by acoustic sleeper manufacturer.

### 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. NES NER-272 for power-driven fasteners.
  2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

#### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below and as required by UL tested floor/ceiling assemblies:
  1. Subflooring:
    - a. Glue and nail to wood framing.
    - b. Space panels 1/8 inch apart at edges and ends.
    - c. Install fasteners at spacing as indicated in Drawings
  2. Wall and Roof Sheathing:
    - a. Nail to wood framing.
    - b. Space panels 1/8 inch apart at edges and ends.
    - c. Install fasteners as indicated in Drawings and in compliance with requirements of authority having jurisdiction

### 3.3 ACOUSTIC SLEEPER AND UNDERLAYMENT INSTALLATION

- A. Wood panel underlayment supported by wood lath and resilient sleeper pads.
  - 1. Comply with requirements of listed agency for fire rated design.
  - 2. Comply with Acoustic Sleeper manufacturer's installation instructions.

### 3.4 WALL SHEATHING JOINT TREATMENT

- A. Seal sheathing joints according to sheathing manufacturer's written instructions.
  - 1. Apply seam tape to joints between sheathing panels.
  - 2. Utilize manufacturer's standard tape gun or hard rubber roller provided by manufacturer to ensure tape is completely adhered to substrates.

### 3.5 FLEXIBLE FLASHING INSTALLATION

- A. Apply self-adhering seam and flashing tape flexible flashing where indicated to comply with manufacturer's written instructions.
  - 1. After flexible flashing tape has been applied, roll surfaces with a hard rubber roller to ensure that flashing is completely adhered to substrates.
  - 2. Width for Flexible Flashing: 6 inch.

END OF SECTION 061600

## SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section include:
  - 1. Wood floor trusses.
  - 2. Wood girder trusses.
  - 3. Wood roof trusses.
- B. Refer to Division 01 "Sustainable Design Requirements" sections for applicable sustainability requirements.

#### 1.2 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

#### 1.3 SUBMITTALS

- A. Product Data: For wood-preservative-treated lumber, fire-retardant treated lumber, metal-plate connectors, and fasteners.
  - 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. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Shop Drawings: As indicated on Drawings and as follows:
  - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
  - 2. Indicate sizes, stress grades, and species of lumber.
  - 3. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
  - 4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
  - 5. Show splice details and bearing details.

- C. Delegated-Design Submittal: For metal-plate-connected wood trusses 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 QUALITY ASSURANCE

- A. Fabricator Qualifications: As indicated on Drawings and as follows:
  - 1. Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction and is certified for chain of custody by an FSC-accredited certification body.
- B. Comply with applicable requirements and recommendations of the following publications:
  - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
  - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
  - 3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
- C. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
  - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
  - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
  - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

#### 1.6 COORDINATION

- A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 010000 "General Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
  - 1. Design Loads: As indicated on Drawings.
  - 2. Maximum Deflection Under Design Loads: As indicated on Drawings.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

### 2.2 DIMENSION LUMBER

- A. 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.
- B. Grade and Species: For truss chord and web members, provide dimension lumber of any species, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
- C. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section "Rough Carpentry."

### 2.3 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip 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); G60 coating designation; and not less than 0.036 inch thick.
  - 1. Use for interior locations where stainless steel is not indicated.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304 or 316, and not less than 0.035 inch thick.
  - 1. Use for exterior locations and where indicated.



## 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. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.

## 2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Allowable design loads, as published by manufacturer, shall comply with or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preservative-treated lumber and where indicated.

## 2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

## 2.7 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
  - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in truss accessories according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
  - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
  - 1. Install bracing to comply with Division 06 Section "Rough Carpentry."
  - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members .
- L. Replace wood trusses that are damaged or do not meet requirements. Do not alter trusses in field.
  - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

**3.2 REPAIRS AND PROTECTION**

- A. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

**3.3 FIELD QUALITY CONTROL**

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections to verify that temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

END OF SECTION 061753

## SECTION 062023 - INTERIOR FINISH CARPENTRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Interior wood trim, including wood door casing.
2. Interior wood stairs.
3. Solid Surfacing window stools.
4. PVC window stools.

- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For stair manufacturer and Installer.

- B. Product Certificates: For the following:

1. Composite wood and agrifiber products.
2. Adhesives.

#### 1.4 QUALITY ASSURANCE

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 010000 "General Requirements," to design wood stairs.

- B. Delegated Engineering Quality Standards: Determine allowable working stresses of materials according to authorities having jurisdiction, applicable local building codes, or information indicated, or, if standard not indicated, use latest editions of following:

1. Wood: AFPA – "National Design Specification for Wood Construction" with supplements.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.
- B. Softwood Plywood: DOC PS 1.
- C. MDF: ANSI A208.2, Grade 130.

### 2.2 INTERIOR TRIM

- A. Softwood Lumber Trim (Opaque finish):
  - 1. Species and Grade: Southern pine, B & B finish; SPIB.
  - 2. Maximum Moisture Content: 15percent.
  - 3. Finger Jointing: Allowed
- B. Hardwood Lumber Trim (Opaque finish):
  - 1. Species and Grade: Aspen, basswood, cottonwood, sap gum, sycamore, white maple, or yellow poplar, A Finish; NHLA.
  - 2. Maximum Moisture Content: 10 percent.
  - 3. Finger Jointing: Not allowed.
- C. Moldings for Opaque Finish (Painted Finish): Made to patterns included in MMPA's "WM/Series Wood Moulding Patterns."
  - 1. Softwood Moldings: MMPA WM 4, P grade.
    - a. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine.
    - b. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
  - 2. Hardwood Moldings: MMPA HWM 4, P-grade.
    - a. Species: Aspen, basswood, cottonwood, gum, magnolia, soft maple, tupelo, or yellow poplar.
    - b. Maximum Moisture Content: 9 percent.
  - 3. Finger Jointing: Allowed.
- D. Molding Patterns: As indicated.
- E. Window Stools: 1/2-inch-thick, solid surface material.

## 2.3 PVC WINDOW STOOLS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Sill-Rite; Vinyl windowsill or comparable substitution approved by Architect:
  - 1. Fire Hazard Ratings:
    - a. Classified in accordance local codes and ordinances, ASTM E84 and the following:
      - 1) Class C
      - 2) Flame Spread: Class C: 76 - 200
      - 3) Smoke Developed: 0-450
  - 2. Thickness: 1/2 inches.
  - 3. Depth and Width: As required to fit window opening with eased front edge.
  - 4. Color: White.

## 2.4 INTERIOR WOOD STAIR

- A. Architectural Woodwork Standards Grade: Custom.
- B. Rough Carriages for Stairs: Select Structural grade, kiln-dried to 15 percent maximum moisture content:
  - 1. Acceptable Species:
    - a. Hem-fir (north).
    - b. Southern pine.
    - c. Douglas fir-larch.
    - d. Douglas fir-larch (north).
    - e. Spruce-pine-fir.
  - 2. Exposed Interior Carriage Faces: If present, select material with minimal blemishes and knots.
- C. Finishes for Stair Parts: Opaque

## 2.5 MISCELLANEOUS MATERIALS

- A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- B. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
- C. Furring, Blocking, Shims, and Nailers: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

- D. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
- E. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
  - 1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
  - 2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

## 2.6 STAIR FABRICATION

- A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
  - 1. Ease edges to radius indicated for the following:
    - a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.
  - 1. Disassemble components only as necessary for shipment and installation.
  - 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
  - 3. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
    - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
    - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.
- C. Stairs: Cut rough carriages to accurately fit treads and risers.
  - 1. Glue treads to risers, and glue and screw treads and risers to carriages.
  - 2. Fabricate stairs with treads and risers no more than 1/8 inch from indicated position and no more than 1/16 inch out of relative position for adjacent treads and risers.
  - 3. Coordinate stair tread/riser profile with rubber stair treads.

## 2.7 STAIR SHOP PRIMING

- A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
- B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 099123 "Interior Painting."

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.
- B. Before installing interior stairs, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

### 3.2 INSTALLATION, GENERAL

- A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
  - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
  - 2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
  - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
  - 4. Install stairs with no more than 3/16-inch variation between adjacent treads and risers and with no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

### 3.3 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

### 3.4 STAIR INSTALLATION

- A. Assemble interior stairs and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- B. Install interior stairs level, plumb, true in line, and without distortion.
  - 1. Shim as required with concealed shims.
  - 2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut interior stairs to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.



- D. Stairs: Securely anchor carriages to supporting substrates.
  - 1. Install stairs with treads and risers no more than 1/8 inch from indicated position.
  - 2. Secure with countersunk, concealed fasteners and blind nailing.
  - 3. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with wood surface.

### 3.5 SOLID SURFACE WINDOW STOOL INSTALLATION

- A. Secure window stools to substrate with adhesive according to solid surface material manufacturer's written instructions.
- B. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 062023

## SECTION 066400 - PLASTIC PANELING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes plastic sheet paneling.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

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

### PART 2 - PRODUCTS

#### 2.1 PLASTIC SHEET PANELING

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or a substitution approved prior to date for receipt of Bids:
    - a. Crane Composites, Inc.
    - b. Glasteel.
    - c. Marlite.
    - d. Newcourt, Inc.
    - e. Nudo Products, Inc.
    - f. Parkland Plastics, Inc.
  - 2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 25 (Class A) or 200 (Class C) or less.
    - b. Smoke-Developed Index: 450 or less.
  - 3. Nominal Thickness: Not less than 0.075 inch.
  - 4. Surface Finish: Molded pebble texture.
  - 5. Color: White.

## 2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, and caps as needed to conceal edges.
  - 1. Color: Match panels.
- B. Adhesive: As recommended by plastic paneling manufacturer and with a VOC content of 50 g/L or less.
- C. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."
  - 1. Sealant shall have a VOC content of 250 g/L or less.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

### 3.2 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive and nails. Do not fasten through panels.
- D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

SECTION 071413 - HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING - **NOT YET EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rubberized-asphalt waterproofing membrane[, **unreinforced**][, **reinforced**].
2. Molded-sheet drainage panels.
3. Insulation.
4. Plaza-deck pavers supported on pedestals.

1.2 PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

- A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

If needed, insert list of conference participants not mentioned in Section 013100 "Project Management and Coordination."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.
- C. Sustainable Design Submittals:
1. <Double click to insert sustainable design text for moisture control>
- D. Samples: For plaza-deck pavers[, **full sized**] in each color and texture required.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

Retain "Installer Qualifications" Paragraph below if applicable. For warranty purposes, manufacturer may qualify an installer. Coordinate paragraph with qualifications manufacturer requires of Installer.

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

## 1.6 WARRANTY

When warranties are required, verify with Owner's counsel that warranties stated in this article are not less than remedies available to Owner under prevailing local laws. Example in "Special Warranty" Paragraph below is a labor-and-material warranty. Verify coverage with manufacturers. Manufacturers' warranties customarily do not include costs of excavating and exposing the waterproofing membrane as well as backfilling and restoring affected construction in vertical applications.

- A. Special Warranty: Manufacturer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within specified warranty period.

Verify available warranties and warranty periods. Fabric-reinforced, hot fluid-applied waterproofing may qualify for 10-year warranties from some manufacturers.

- 1. Warranty Period: [**Five**] [**10**] **<Insert number>** years from date of Substantial Completion.

## PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

### 2.1 WATERPROOFING MEMBRANE

- A. Hot Fluid-Applied, Rubberized-Asphalt Waterproofing Membrane: Single component; 100 percent solids; hot fluid-applied, rubberized asphalt.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Insert product physical and performance properties below if required. Manufacturers still report properties in accordance with withdrawn CAN/CGSB-37.50, "Hot Applied, Rubberized Asphalt for Roofing and Waterproofing." See Evaluations for discussion and a listing of these properties.

## 2.2 AUXILIARY MATERIALS

Revise primer and adhesives in this article to manufacturer-approved, VOC-conforming products when VOC limits apply.

- A. Primer: ASTM D41/D41M, asphaltic primer.

Retain "Elastomeric Sheet" Paragraph below if used to reinforce joints, cracks, and terminations or for flashings. Revise or insert proprietary materials, such as self-adhering, rubberized asphalt with fabric facer or modified bituminous sheet, if not subject to hydrostatic head or frequent immersion in water.

- B. Elastomeric Sheet: **50-mil- (1.3-mm-)** minimum, uncured sheet neoprene[ **with manufacturer's recommended contact adhesives**] as follows:
1. Tensile Strength: **1400 psi (9.6 MPa)** minimum; ASTM D412, Die C.
  2. Elongation: 300 percent minimum; ASTM D412.
  3. Tear Resistance: **125 psi (860 kPa)** minimum; ASTM D624, Die C.
  4. Brittleness: Does not break at minus **30 deg F (34 deg C)**; ASTM D2137.

Retain "Metal Termination Bars" Paragraph below if required by manufacturer to fasten top edge of elastomeric flashing sheet against wall at expansion or moving joints.

- C. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum termination bars; approximately **1 by 1/8 inch (25 by 3 mm)** thick; with stainless steel anchors.
- D. Sealants and Accessories: Manufacturer's recommended sealants and accessories.

Retain "Reinforcing Fabric" Paragraph below for joint-reinforcing fabric strips and for reinforced waterproofing membrane.

- E. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.

Retain one of two "Protection Course" paragraphs below, or revise to insert other protection materials. Distinguish locations, such as plaza-deck and foundation walls, if more than one type of protection course is required.

Asphaltic protection course in first "Protection Course" Paragraph below is manufactured by W. R. Meadows and is also available from several other waterproofing manufacturers.

- F. Protection Course: ASTM D6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
1. Thickness: [**1/8 inch (3 mm)**] [**1/4 inch (6 mm)**], nominal.
  2. Thickness: **1/8 inch (3 mm)**, nominal, for vertical applications; **1/4 inch (6 mm)**, nominal, elsewhere.
- G. Protection Course: Manufacturer's standard, **80- to 90-mil- (2.0- to 2.3-mm-)** thick, fiberglass-reinforced rubberized asphalt or modified bituminous sheet.

## 2.3 MOLDED-SHEET DRAINAGE PANELS

Retain this article if drainage panels are required. Retain "Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel" Paragraph below if specifying nonwoven-geotextile-faced drainage panels, usually for foundation walls.

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding **No. 70 (0.21 mm)** sieve, laminated to one side [**with**] [**or**] [**without**] a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of **9 to 15 gpm/ft. (112 to 188 L/min. per m)**.

Retain "Woven-Geotextile-Faced, Molded-Sheet Drainage Panel" Paragraph below if specifying woven-geotextile-faced drainage panels, usually for plaza decks.

- B. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a woven-geotextile facing with an apparent opening size not exceeding **No. 40 (0.43 mm)** sieve, laminated to one side [**with**] [**or**] [**without**] a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a horizontal flow rate not less than **2.8 gpm/ft. (35 L/min. per m)**.

## 2.4 INSULATION

Retain "Board Insulation" Paragraph below if board insulation is required over waterproofing and if board insulation forms the first layer beneath an insulation drainage panel. Type IV and Type VI insulation are usually limited to vertical applications. Type VII and Type V insulation, with higher compressive resistances, are used on plaza decks.

- A. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C578, [**Type IV, 25 psi (173 kPa)**] [**Type VI, 40 psi (276 kPa)**] [**Type VII, 60 psi (414 kPa)**] [**Type V, 100 psi (690 kPa)**] minimum compressive resistance, [**square**] [**or**] [**shiplap**] edged.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

## 2.5 PLAZA-DECK PAVERS

Retain this article for plaza-deck pavers supported on pedestals.

"Plaza-Deck Pavers" Paragraph below describes concrete pavers commonly used in pedestal-set applications over insulation and waterproofing. Limit pedestal systems to pedestrian plazas. Verify availability of deck pavers with characteristics retained.

- A. Plaza-Deck Pavers: Heavyweight, hydraulically pressed, concrete units, [**square edged**] [**with top edges beveled 3/16 inch (5 mm)**], manufactured for use as plaza-deck pavers; minimum compressive strength [**7500 psi (52 MPa)**] [**6500 psi (45 MPa)**] **<Insert value>**, ASTM C140; absorption not greater than 5 percent, ASTM C140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance in accordance with ASTM C67.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain one thickness and one face size from options in "Thickness" and "Face Size" subparagraphs below. Include special paver sizes and insert descriptions of custom pavers, such as stair tread and riser units, coping or curved termination pavers, and oversize pavers.

2. Thickness: [1-5/8 inches (41 mm)] [1-3/4 inches (45 mm)] [2 inches (51 mm)] [2-3/8 inches (60 mm)] <Insert dimension>.
3. Face Size: [8-7/8 inches (225 mm) square] [9 inches (229 mm) square] [9 by 18 inches (229 by 457 mm)] [12 inches (305 mm) square] [12 by 24 inches (305 by 610 mm)] [18 inches (457 mm) square] [24 inches (610 mm) square] [As indicated] <Insert dimensions and shape>.
4. Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color>.

Retain "Paver Supports" Paragraph below if using pedestal systems for paver supports.

- B. Paver Supports: Paver manufacturer's standard SBR rubber, high-density polyethylene, or polyurethane paver support assembly, including [fixed-height] [adjustable or stackable] pedestals, shims, and spacer tabs for joint spacing of [1/8 inch (3 mm)] [3/16 inch (5 mm)] [1/8 to 3/16 inch (3 to 5 mm)].

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean and prepare substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

### 3.2 JOINTS, CRACKS, AND TERMINATIONS

- A. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, deck drains, corners, and penetrations according to manufacturer's written instructions.

Usually retain two subparagraphs below. Retain first for reinforcing strips over moving or large joints and cracks.

1. Adhere strip of elastomeric sheet to substrate in a layer of hot rubberized asphalt. Extend elastomeric sheet a minimum of 6 inches (150 mm) on each side of moving joints and cracks or joints and cracks exceeding 1/8 inch (3 mm) thick, and beyond deck drains and penetrations. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.

Retain subparagraph below for reinforcing strips over nonmoving joints and cracks not exceeding 1/8 inch (3 mm) thick.



2. Embed strip of reinforcing fabric into a layer of hot rubberized asphalt. Extend reinforcing fabric a minimum of **6 inches (150 mm)** on each side of nonmoving joints and cracks not exceeding **1/8 inch (3 mm)** thick, and beyond roof drains and penetrations.

Retain subparagraph below with fabric-reinforced joints for unreinforced waterproofing membrane.

- a. Apply second layer of hot fluid-applied, rubberized asphalt over reinforcing fabric.

Revise or delete paragraph below if using expansion-joint gaskets or expansion-joint cover assemblies. Do not use modified bituminous flashing sheets for this condition.

- B. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge joints with elastomeric sheet extended a minimum of **6 inches (150 mm)** on each side of joints and adhere to substrates in a layer of hot rubberized asphalt. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.

### 3.3 FLASHING INSTALLATION

- A. Install elastomeric sheets at terminations of waterproofing membrane according to manufacturer's written instructions.

### 3.4 MEMBRANE APPLICATION

- A. Apply primer, at manufacturer's recommended rate, over prepared substrate and allow it to dry.
- B. Heat and apply rubberized asphalt according to manufacturer's written instructions.

Retain "Unreinforced Membrane" or "Reinforced Membrane" Paragraph below, or both. If retaining both, indicate location of each system on Drawings.

- C. Unreinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to form a uniform, unreinforced, seamless membrane, [**180-mil (4.5-mm) minimum thickness**] [**180-mil (4.5-mm) average thickness, but not less than 125 mils (3.2 mm) thick**].
- D. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of **90 mils (2.3 mm)**; embed reinforcing fabric, overlapping sheets **2 inches (50 mm)**; spread another **125-mil- (3.2-mm-)** thick layer to provide a uniform, reinforced, seamless membrane **215 mils (5.5 mm)** thick.
- E. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.

Protection course also prevents insulation from sticking to membrane. Retain first option in paragraph below for foundation wall applications and second option for horizontal applications.

- F. Cover waterproofing with protection course with overlapped joints before membrane is subject to [**backfilling**] [**construction or vehicular traffic**].

### 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 methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

Retain subparagraph below if board insulation or protection course is installed before installing molded-sheet drainage panels.

- 1. For vertical applications, install **[board insulation]** **[protection course]** before installing drainage panels.

### 3.6 INSULATION INSTALLATION

Retain first paragraph below if support is required during backfilling.

- A. On vertical surfaces, set insulation units into rubberized asphalt according to manufacturer's written instructions.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

### 3.7 PLAZA-DECK PAVER INSTALLATION

- A. Install concrete pavers according to manufacturer's written instructions.

Retain first two paragraphs below if setting pavers on paving pedestals.

- B. Accurately install **[fixed]** **[adjustable]**-height paver pedestals and accessories to elevations required. Adjust for final level and slope with shims.
- C. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.

Insert special installation requirements below. Examples might include tread/riser units on tabs or treatment of pavers at plaza/building expansion joints.

- D. Install pavers to not vary more than **1/16 inch (1.6 mm)** in elevation between adjacent pavers or more than **1/16 inch (1.6 mm)** from surface plane elevation of individual paver.
- E. Limit variation in paving installation to within **[1/4 inch in 10 feet (6 mm in 3 m)]** **<Insert dimensions>** of surface plane in any direction; noncumulative.

### 3.8 CLEANING AND PROTECTION

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

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

END OF SECTION 071413

## SECTION 071700 - BENTONITE WATERPROOFING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Geotextile/bentonite sheet waterproofing.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Provide waterproofing that prevents the passage of water according to the following criteria:
  - 1. Permeability: 1 by  $10^{-9}$  cm/sec. according to ASTM D 5084.
  - 2. Grab Tensile Strength: 95 lbf according to ASTM D 4632.
  - 3. Elongation: 75 percent according to ASTM D 4632.
  - 4. Puncture Resistance: 100 psi according to ASTM D 4833.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include product specifications and manufacturer's written installation instructions.
- B. Shop Drawings: Show installation details for interface with other work.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for bentonite waterproofing.
- D. Warranty: Special warranty specified in this Section.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain bentonite waterproofing system through one source from a single manufacturer. Obtain accessory products used with bentonite waterproofing from sources acceptable to bentonite waterproofing manufacturer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace bentonite materials that have been prematurely exposed to moisture.

## 1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit bentonite waterproofing to be installed according to manufacturers' written instructions and warranty requirements.
  - 1. Do not apply waterproofing materials to surfaces where ice or frost is visible. Do not apply bentonite waterproofing materials in areas with standing water.
  - 2. Placing of bentonite clay products in panel or composite form on damp surfaces is allowed if approved in writing by manufacturer.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of bentonite waterproofing system that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Water penetrating the building or structure resulting from substrate cracking of up to 1/8 inch.
    - b. Deteriorated or displaced waterproofing materials.
  - 2. Issuance of manufacturer's system warranty requires the following:
    - a. Manufacturer's approved applicator to install bentonite waterproofing products and prefabricated drainage composite.
    - b. Manufacturer's standard bentonite waterstop must be installed in all applicable horizontal and vertical cold pour concrete construction joints.
  - 3. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide the products listed in other Part 2 articles or by substitution approved by Architect prior to Bid Date.

### 2.2 MATERIALS, GENERAL

- A. Granular Bentonite: Sodium bentonite clay containing a minimum of 90 percent montmorillonite (hydrated aluminum silicate), with a minimum of 90 percent passing a No. 20 sieve.
- B. Bentonite Mastic: Trowelable consistency, bentonite compound, specifically formulated for application at joints and penetrations.

- C. Granular Bentonite Tubes: Manufacturer's standard 2-inch-diameter, water-soluble tube containing approximately 1.5 lb/ft. of bentonite; hermetically sealed; designed specifically for placing on wall footings at line of joint with exterior base of wall.
- D. Preformed Waterstop: Flexible strip of bentonite waterproofing compound in cartridge or coil form; designed specifically for vertical and horizontal joints in concrete construction.

## 2.3 GEOTEXTILE/BENTONITE SHEETS

- A. Geotextile/Bentonite Waterproofing: Minimum of 1.0 lb/sq. ft. of bentonite clay granules between 2 layers of geotextile polypropylene fabric, one woven and one nonwoven, needlepunched and heat fused together.
  - 1. Product: CETCO; Voltex.

## 2.4 INSTALLATION ACCESSORIES

- A. Molded-Sheet Drainage Panels: Prefabricated, composite drainage panels, manufactured with a permeable geotextile facing laminated to a molded-plastic, three-dimensional sheet drainage core.
  - 1. Products:
    - a. CETCO; Aquadrain.
    - b. Carlisle Coatings & Waterproofing Inc.; MiraDRAIN 2000.
- B. Termination Bar: Extruded-aluminum or formed-stainless-steel bars with upper flange to receive sealant.
- C. Fasteners: Case-hardened nails or hardened-steel, powder-actuated fasteners. Depending on manufacturer's written requirements, provide 1/2- or 1-inch-diameter washers under fastener heads.
- D. Sealants: As recommended in writing by waterproofing manufacturer. Comply with requirements specified in Division 07 Section "Joint Sealants."
- E. Tapes: As recommended in writing by waterproofing manufacturer for joints between sheets or panels.
- F. Adhesive: Water-based adhesive used to secure membrane to both vertical and horizontal surfaces.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate preparations affecting performance of bentonite waterproofing.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of bentonite waterproofing.
  - 2. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify that substrate is complete and that all work that will penetrate waterproofing is complete and rigidly installed. Verify locations of waterproofing termination.

### 3.2 PREPARATION

- A. Coordinate work in the vicinity of waterproofing to ensure proper conditions for installing the waterproofing system and to prevent damage to waterproofing after installation.
- B. Formed Concrete Surfaces: Remove fins and projections. Fill voids, rock pockets, form-tie holes, and other defects with bentonite mastic or cementitious patching material according to manufacturer's written instructions.
- C. Excavation Support and Protection or Stable Excavation: If water is seeping, use plastic sheets or other suitable means to prevent wetting the bentonite waterproofing. Fill minor gaps and spaces 1/8 inch wide or wider with wood, metal, concrete, or other appropriate filling material. Cover or fill large voids and crevices with cement mortar according to manufacturer's written instructions.

### 3.3 INSTALLATION, GENERAL

- A. Install waterproofing and accessories according to manufacturer's written instructions, standard details, and recommended practices.
  - 1. Apply linear joint-sealing tubes, bentonite mastic, or both at changes of plane, construction joints in substrate, projections, and penetrations.
- B. Apply granular bentonite continuously at base of wall waterproofing (on footing, against wall) according to manufacturer's written instructions.
- C. Protect waterproofing from damage and wetting before and during subsequent construction operations. Repair punctures, tears, and cuts according to manufacturer's written instructions.
- D. Apply sealants to comply with requirements specified in Division 07 Section "Joint Sealants" and with manufacturer's written instructions.

### 3.4 GEOTEXTILE/BENTONITE SHEET INSTALLATION

- A. General: Install a continuous layer of waterproofing sheets with woven geotextile side directly against concrete to be waterproofed. Lap ends and edges a minimum of 4 inches on horizontal and vertical substrates. Stagger end joints between sheets a minimum of 24 inches. Fasten seams by stapling to adjacent sheet or nailing to substrate.
- B. Concrete Walls: Starting at bottom of wall, apply waterproofing sheets horizontally with primary backing side against wall. Secure with powder-actuated fasteners or case-hardened, steel-cap masonry nails; spaced according to manufacturer's written instructions. Extend to bottom of footing, grade beam, or wall and secure as recommended in writing by manufacturer.
  - 1. Termination at Grade: Extend waterproofing sheets to within 2 inches of finish grade, unless otherwise indicated. Secure top edge with termination bar. Apply sealant to top edge of termination bar.

### 3.5 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

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

### 3.6 FIELD QUALITY CONTROL

- A. Inspection: Arrange for manufacturer's representative to inspect completed installation and provide written report that installation complies with manufacturer's written instructions.
  - 1. Remove and replace applications of bentonite waterproofing where inspection indicates that it does not comply with specified requirements.
- B. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 071700



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SECTION 071900 - WATER REPELLENTS – **NOT YET EDITED**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:
  - 1. Cast-in-place concrete.
  - 2. Precast concrete.
  - 3. Cast stone.
  - 4. Concrete unit masonry.
  - 5. Clay brick masonry.
  - 6. Natural stone.
  - 7. Portland cement plaster (stucco).

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** <Insert location>.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of water repellent and substrate indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.

PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with

manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

## 2.1 PENETRATING WATER REPELLENTS

Retain one or more types of water repellent in this article. If more than one type is required, indicate locations of each on Drawings or by inserts.

- A. Penetrating Low-VOC Silane Water Repellent: Clear, containing [20] [40] [100] <Insert number> percent or more active content of [modified] silane; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with 400 g/L or less of VOCs.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products>](#)
- B. Penetrating Silane Water Repellent: Clear, containing [20] [40] [100] <Insert number> percent or more active content of [modified] silane; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with 600 g/L or less of VOCs.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products>](#)
- C. Penetrating Low-VOC Siloxane Water Repellent: Clear, containing [10] [12] <Insert number> percent or more solids of oligomeric [modified] silane; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with 400 g/L or less of VOCs.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products>](#)
- D. Penetrating Siloxane Water Repellent: Clear, containing [10] [12] <Insert number> percent or more active content of [modified] silane; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with 600 g/L or less of VOCs.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products>](#)
- E. Penetrating Low-VOC Silane/Siloxane-Blend Water Repellent: Clear, containing [10] [12] <Insert number> percent or more active content of silane and siloxane blend with 400 g/L or less of VOCs.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products>](#)
- F. Penetrating Silane/Siloxane-Blend Water Repellent: Clear, containing [10] [12] <Insert number> percent or more active content of silane and siloxane blend with 600 g/L or less of VOCs.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products>](#)
- G. Penetrating Water and Oil Repellent: Clear, oleophobic water repellent; with 400 g/L or less of VOCs.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products>](#)

- H. Penetrating Water Repellent and Corrosion Inhibitor: Clear, containing [100] <Insert number> percent or more active content of modified [silane] [siloxane] water repellent and corrosion inhibitor, with 400 g/L or less of VOCs.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- I. Penetrating Water Repellent for Calcareous Stone: Clear, modified silane with ethyl silicate, specially formulated for limestone and marble.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.
  - 1. Verify that surfaces are clean and dry in accordance with water-repellent manufacturer's requirements. Check moisture content in representative locations by method recommended by manufacturer.
  - 2. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.
  - 3. Verify that required repairs are complete, cured, and dry before applying water repellent.
- B. Test pH level in accordance with water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.

### 3.2 PREPARATION

- A. New Construction and Repairs: Allow concrete and other cementitious materials to age before application of water repellent, in accordance with repellent manufacturer's written instructions.
- B. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product in accordance with water-repellent manufacturer's written instructions[ **and as follows:**][.]
- C. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.
- D. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
  - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

### 3.3 APPLICATION

Retain "Manufacturer's Field Service" Paragraph below for large projects only; service specified may not be available in all regions.

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
- B. Apply coating of water repellent on surfaces to be treated using low-pressure spray to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.
  - 1. **[Precast Concrete] [and] [Cast Stone]**: At Contractor's option, first application of water repellent may be completed before installing units. Mask mortar and sealant bond surfaces to prevent water repellent from migrating onto joint surfaces. Remove masking after repellent has cured.

Retain paragraph below for porous surfaces such as concrete block unless second coat is not recommended by manufacturer.

- C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

### 3.4 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application.
- B. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071900

## SECTION 072100 - THERMAL INSULATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board.
2. Glass-fiber blanket.
3. Mineral-wool blanket.

- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

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

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.

### PART 2 - PRODUCTS

#### 2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD (XPS BOARD)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. DiversiFoam Products.
  2. Dow Chemical Company (The).
  3. Kingspan Insulation LLC.
  4. Owens Corning.
- 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.

## 2.2 GLASS-FIBER BLANKET

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CertainTeed Corporation.
  - 2. Johns Manville; a Berkshire Hathaway company.
  - 3. Knauf Insulation.
  - 4. Owens Corning.
- B. 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.
- C. Glass-Fiber Blanket, Kraft Faced: ASTM C 665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).
- D. Glass-Fiber Blanket, Foil Faced: ASTM C 665, Type III (reflective faced), Class A (Membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim kraft.

## 2.3 MINERAL-WOOL BLANKETS

- A. Mineral-Wool Blanket, Unfaced (For fire safing as required): ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ROXUL.
    - b. Thermafiber, Inc.; an Owens Corning company.

## 2.4 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. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.
- C. 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 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.
- E. Installation at Masonry Cavity Walls: Refer to Section 042000 "Unit Masonry."

### 3.2 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 36 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 36 inches Insert dimension in from exterior walls.

### 3.3 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face and as recommended by manufacturer.
  - 1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
  - 2. Press units firmly against inside substrates.
  - 3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose.



### 3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  - 4. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
    - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
  - 5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
    - a. Exterior Walls: Set units with facing placed toward interior of construction.
- B. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
- C. 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.

END OF SECTION 072100

SECTION 072500 - WEATHER BARRIERS – **NOT YET EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

Revise subparagraphs below to suit Project.

1. Building paper.
2. Building wrap.
3. Drainage wrap.
4. Flexible flashing.
5. Drainage material.

1.2 ACTION SUBMITTALS

A. Product data.

B. Sustainable Design Submittals:

1. [<Double click to insert sustainable design text for EPDs and HPDs.>](#)
2. [<Double click here to insert sustainable design text for Health Product Declaration.>](#)

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For [**water-resistive barrier**] [**and**] [**flexible flashing**], from ICC-ES.

PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

## 2.1 WATER-RESISTIVE BARRIER

Usually retain this article; a water-resistive barrier over sheathing is inexpensive and is required behind masonry veneers. Delete article if a water-resistive barrier will interfere with exterior insulation and finish systems or similar construction.

Retain one of two "Building Paper" paragraphs, "Building Wrap" Paragraph, or "Drainage Wrap" Paragraph below.

- A. Building Paper: ASTM D226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.
- B. Building Paper: Water-vapor-permeable, asphalt-saturated kraft building paper that complies with ICC-ES AC38, Grade D[; **except with water-resistance rating not less than 1 hour**].

First three options in "Building Wrap" Paragraph below apply to weather-resistant barriers; ASTM E2556/E2556M classifies Type I as having base-level water resistance and Type II as having enhanced water resistance. ASTM E1677 in fourth option is for air barrier materials for low-rise buildings and allows 15 times more air infiltration as the limit for air barrier materials in many building codes. Some products meet more than one listed option; verify with manufacturer.

- C. Building Wrap: [ASTM E2556/E2556M, Type I] [ASTM E2556/E2556M, Type II] [ICC-ES AC38] [ASTM E1677, Type I] air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.

- 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Coordinate permeance value retained or inserted in "Water-Vapor Permeance" Subparagraph below with products retained. Consult manufacturers' literature.

- 2. Water-Vapor Permeance: Minimum [75 perms (4300 ng/Pa x s x sq. m)] [20 perms (1150 ng/Pa x s x sq. m)] [8 perms (460 ng/Pa x s x sq. m)] <Insert value> per ASTM E96/E96M, Desiccant Method (Procedure A).

Retain "Flame Propagation Test" Subparagraph below if required. Tested products are not available from all manufacturers for all types of assemblies.

- 3. Flame Propagation Test: Materials and construction to be as tested in accordance with NFPA 285.

First three options in "Drainage Wrap" Paragraph below apply to weather-resistant barriers; ASTM E2556/E2556M classifies Type I as having base-level water resistance and Type II as having enhanced water resistance. ASTM E1677 in fourth option is for air barrier materials for low-rise buildings and allows 15 times more air infiltration as the limit for air barrier materials in many building codes. Some products meet more than one listed option; verify with manufacturer.

- D. Drainage Wrap: [ASTM E2556/E2556M, Type I] [ASTM E2556/E2556M, Type II] [ICC-ES AC38] [ASTM E1677, Type I] dimensional water-resistive barrier that also creates a drainage plane; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; and acceptable to authorities having jurisdiction.

- 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Coordinate permeance value retained or inserted in "Water-Vapor Permeance" Subparagraph below with required code and products retained. Consult manufacturers' literature.

2. Water-Vapor Permeance: Minimum [**55 perms (3147 ng/Pa x s x sq. m)**] [**35 perms (2002 ng/Pa x s x sq. m)**] [**15 perms (858 ng/Pa x s x sq. m)**] [**5 perms (286 ng/Pa x s x sq. m)**] <Insert value> per ASTM E96/E96M, Desiccant Method (Procedure A).

Value in "Air Permeance" Subparagraph below is based on ICC-ES criteria for air barrier materials and is far more stringent than the requirement in ASTM E1677. Confirm value with manufacturers' literature.

3. Air Permeance: Maximum [**0.004 cfm/sq. ft. at 0.3-inch wg (0.02 L/s x sq. m at 75 Pa)**] <Insert value> when tested in accordance with ASTM E2178.

ASTM E2273 is a requirement for drainage with EIFS cladding, commonly used by the industry to establish drainage performance.

4. Drainage: Not less than [**90**] [**95**] [**98**] percent when tested in accordance with ASTM E2273.
  5. Allowable UV Exposure Time: Not more than [**120**] [**180**] days.
- E. Acrylic Seam Tape: Composite tape consisting of a pressure-sensitive acrylic adhesive, bonded to a polyethylene or polypropylene film for sealing joints and penetrations in building wrap. [**Provide tape from same manufacturer as approved wrap product.**]
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  2. Width: [**2 inches (51 mm)**] [**3 inches (76 mm)**].

## 2.2 FLEXIBLE FLASHING

- A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber 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 (0.6 mm)**] [**0.030 inch (0.8 mm)**] [**0.040 inch (1.0 mm)**].
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain "Flame Propagation Test" Subparagraph below if required. Tested products are not available from all manufacturers for all types of assemblies.

2. Flame Propagation Test: Materials and construction to be as tested in accordance with NFPA 285.
- B. Rubberized-Asphalt Flashing: Composite, self-adhesive, flashing product consisting of a pliable, 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 (0.6 mm)**] [**0.030 inch (0.8 mm)**] [**0.040 inch (1.0 mm)**].
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain "Flame Propagation Test" Subparagraph below if required. Tested products are not available from all manufacturers for all types of assemblies.

2. Flame Propagation Test: Materials and construction to be as tested in accordance with NFPA 285.

## 2.3 DRAINAGE MATERIAL

- A. Rainscreen Drainage Mat: Free-draining polymer-strand mesh sheets or strips with thickness not less than [full depth of cavity] [**3/4 inch (19 mm)**] [**1 inch (25 mm)**] [**1-1/2 inches (38 mm)**] [**2 inches (51 mm)**] <Insert thickness> and installed to full height of cavity, [with additional strips **4 inches (102 mm)** high above flashing locations and thick enough to fill entire depth of cavity] to maintain a continuous open space behind exterior cladding.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  2. Location: [Underneath siding] [Behind portland cement plaster] [Behind adhered masonry veneer] [As indicated on drawings] <Insert component>.
- B. Drainage Accessories: [Furring strips] <Insert component> to maintain a continuous open space between water-resistive barrier and exterior cladding to create a continuous open space behind exterior cladding.

## PART 3 - EXECUTION

### 3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover sheathing with water-resistive barrier as follows:
1. Cut back barrier **1/2 inch (13 mm)** on each side of the break in supporting members at expansion- or control-joint locations.
  2. Apply barrier to cover vertical flashing with a minimum **4-inch (100-mm)** overlap unless otherwise indicated.

Retain "Building Paper" or "Building Wrap or Drainage Wrap" Paragraph below to coordinate with products retained in Part 2.

- B. Building Paper: Apply horizontally with a **2-inch (50-mm)** overlap and a **6-inch (150-mm)** end lap; fasten to sheathing with galvanized staples or roofing nails.
- C. Building Wrap or Drainage Wrap: Comply with manufacturer's written instructions and warranty requirements.
1. Seal seams, edges, fasteners, and penetrations with tape.
  2. Extend into jambs of openings and seal corners with tape.

### 3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
1. Lap seams and junctures with other materials at least **4 inches (100 mm)** except that at flashing flanges of other construction, laps need not exceed flange width.
  2. Lap flashing over water-resistive barrier at bottom and sides of openings.
  3. Lap water-resistive barrier over flashing at heads of openings.

3.3 DRAINAGE MATERIAL INSTALLATION

- A. Install drainage material over building wrap and flashing to comply with manufacturer's written instructions.

END OF SECTION 072500

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SECTION 072600 - VAPOR RETARDERS – **NOT YET EDITED**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Polyethylene vapor retarders.
  - 2. Reinforced-polyethylene vapor retarders.
- B. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

- 1. Section 033000 "Cast-in-Place Concrete" for under-slab vapor retarders.
- 2. Section 072100 "Thermal Insulation" for vapor retarders integral with insulation products.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.

PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

2.1 POLYETHYLENE VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D4397, [~~6-mil-~~ (0.15-mm-)] [~~10-mil-~~ (0.25-mm-)] thick sheet, with maximum permeance rating of 0.1 perm (5.7 ng/Pa x s x sq. m).



## 2.2 REINFORCED-POLYETHYLENE VAPOR RETARDERS

Weight in option in "Reinforced-Polyethylene Vapor Retarders" Paragraph below is an example only; revise to suit Project. Coordinate with manufacturers selected.

- A. Reinforced-Polyethylene Vapor Retarders: Sheet with outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than [20 lb/1000 sq. ft. (9 kg/100 sq. m)] <Insert weight>, with maximum permeance rating of 0.1 perm (5.7 ng/Pa x s x sq. m).

1. <[Double click here to find, evaluate, and insert list of manufacturers and products.](#)>

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF VAPOR RETARDERS ON FRAMING

- A. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

### 3.2 INSTALLATION OF VAPOR RETARDERS IN CRAWL SPACES

- A. Install vapor retarders over prepared grade. Lap joints a minimum of 12 inches (305 mm) and seal with manufacturer's recommended tape. Install second layer over pathways to equipment.
- B. Extend vapor retarder over footings and seal to foundation wall or grade beam with manufacturer's recommended tape.
1. Extend vapor retarder vertically minimum [16 inches (406 mm)] [24 inches (610 mm)] <Insert dimension> above top of footing.
- C. Seal around penetrations such as utilities and columns in order to create a monolithic, airtight membrane at grade surface, perimeter, and all vertical penetrations.

END OF SECTION 072600

SECTION 074213.23 - METAL COMPOSITE MATERIAL WALL PANELS – **NOT YET EDITED**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Metal composite material (MCM) panels.
  - 2. Metal composite material (MCM) systems.

1.2 DEFINITIONS

Retain terms that remain after this Section has been edited for a project. Include only essential definitions or acronyms not well understood by the affected industry or trade.

- A. DBVC: Drained and back-ventilated cavity rainscreen system designed to drain and dry water entering cavity through drainage channels, weeps, and air ventilation.
- B. MCM: Metal composite material; cladding material formed by joining two thin metal skins to polyethylene or fire-retardant core and bonded under precise temperature, pressure, and tension.
- C. PER: Pressure-equalized rainscreen system designed for no water intrusion, with equal pressure within air cavity and outside cladding barrier.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.4 ACTION SUBMITTALS

- A. Product data.
- B. Shop Drawings:
  - 1. Include fabrication and installation layouts of MCM system; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, accessories, and special details.
  - 2. Accessories: Include details of flashing, trim, and anchorage, at a scale of not less than **1-1/2 inches per 12 inches (1:10)**.
  - 3. Provide signed and sealed drawings, by a qualified design professional in Project jurisdiction, of MCM system showing compliance with performance requirements and design criteria identified for this Project.
- C. Samples: For each type of MCM panel and system indicated, with factory-applied color finishes.

Retain "Delegated Design Submittals" Paragraph below if design services have been delegated to Contractor.

- D. Delegated Design Submittals: For MCM system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Retain "Sustainable Design Submittals" Paragraph below if required to attain sustainability rating or to track sustainability submittals.

- E. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>
2. <Double click to insert sustainable design text for EPDs and HPDs.>

## 1.5 INFORMATIONAL SUBMITTALS

- A. Test and Evaluation Reports:

1. Product Test Reports: For each **[MCM panel]** **[MCM system]**, for tests performed by **[qualified testing agency]** **[manufacturer and witnessed by a qualified testing agency]**.
  - a. MCM panel manufacturer's material test reports.
  - b. Fabricator's MCM system test reports.

In first three subparagraphs below, retain only those systems required for this Project and delete others.

- 1) **[Dry]** **[Wet]** Seal System: Tested to AAMA 501.1.
- 2) DBVC System: Tested to AAMA 509.
- 3) PER System: Tested to AAMA 508.

2. Research reports.

- B. Delegated design engineer qualifications.

- C. Sample warranties.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance data.

- B. Warranty documentation.

## 1.7 QUALITY ASSURANCE

- A. Qualifications:

1. Fabricator: **[Approved by MCM panel manufacturer]** **[Certified MCM fabricator by the Metal Construction Association]**.

2. Installer: **[Fabricator of MCM system] [Entity that employs installers and supervisors who are trained and approved by MCM system manufacturer]**.
3. Delegated Design Engineer: A professional engineer who is legally qualified to practice in [state] **<Insert jurisdiction>** where Project is located and who is experienced in providing engineering services of the type indicated.
4. Testing Agency: An agency acceptable to authorities having jurisdiction.

## 1.8 WARRANTY

- A. Panel Integrity Warranty: Manufacturer agrees to repair or replace components of MCM panels that fail in materials or workmanship within specified warranty period.

Verify warranty periods for MCM panels.

1. Warranty Period: **[Two] [Five] [10] <Insert number>** years from date of Substantial Completion.
- B. Panel Finish Warranty: Manufacturer agrees to repair finish or replace MCM panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

Verify warranty periods for MCM panel finishes and insert number in "Finish Warranty Period" Subparagraph below. A 20-year period is typically available for PVDF finishes and longer periods for premium finishes may be available.

1. Finish Warranty Period: **[20] [10] <Insert number>** years from date of Substantial Completion.

Insert requirements for system warranty, if available. Verify warranty periods for MCM systems.

- C. MCM System Warranty: **[System manufacturer's] [Fabricator's]** standard form in which manufacturer agrees to repair or replace components of MCM systems that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: **[One] [Two] [Five] <Insert number>** years from date of Substantial Completion.

## PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

## 2.1 PERFORMANCE REQUIREMENTS

Retain "Delegated Design" Paragraph below if Contractor is required to assume responsibility for design.

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design MCM system.

Retain "Seismic Performance" Paragraph below if required by local seismic zone. Tested products are not available from all manufacturers.

- B. Seismic Performance: No failure or deterioration of the system when laterally racked to **3/4 inch (19 mm)** in both directions and repeated for three cycles in accordance with AAMA 501.4. System must pass the static water test as described in ASTM E331 following the seismic racking.
- C. <Double click to insert sustainable design text for recycled content.>
- D. Structural Performance: MCM systems to withstand the effects of the following loads, based on testing in accordance with ASTM E330/E330M:
1. Wind Loads: As indicated on Drawings.
  2. Other Design Loads: [**As indicated on Drawings**] **<Insert loads>**.
  3. Deflection Limits: For wind loads, no greater than **[1/180] [1/240]** **<Insert deflection>** of the span.
  4. **<Insert serviceability requirements>**.
- E. Air Infiltration: Air leakage of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** when tested in accordance with ASTM E283/E283M at the following test-pressure difference:

Value in first option in "Test-Pressure Difference" Subparagraph below is equivalent to a 25 mph (40 km/h) wind and is ASTM E283/E283M default. Products tested to value in second option below, equivalent to a 50 mph (80 km/h) wind, are widely available.

1. Test-Pressure Difference: [**1.57 lbf/sq. ft. (75 Pa)**] [**6.24 lbf/sq. ft. (300 Pa)**].

ASTM E331 in "Water Penetration under Static Pressure" Paragraph below indicates that "water contained within drainage flashings, gutters, and sills is not considered failure."

- F. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:

Value in first option in "Test-Pressure Difference" Subparagraph below is equivalent to a 34 mph (55 km/h) wind and is ASTM E331 default. Products tested to value in second option below, equivalent to a 50 mph wind (80 km/h), are widely available.

1. Test-Pressure Difference: [**2.86 lbf/sq. ft. (137 Pa)**] [**6.24 lbf/sq. ft. (300 Pa)**].

- G. Water Penetration under Dynamic Pressure: No water penetration when tested in accordance with AAMA 501.1 at the following test pressure:

1. Test Pressure: [**6.24 psf (300 Pa)**] [**12 psf (580 Pa)**] [**15 psf (720 Pa)**] **<Insert pressure>**.

Retain "Pressure Cycling" Paragraph below for PER for compliance with voluntary standard AAMA 508, which also requires testing to ASTM E283/E283M, ASTM E330/E330M, ASTM E331, and AAMA 501.1.

- H. Pressure Cycling: Provide PER system with a pass rating in accordance with AAMA 508.
  - 1. Lag between the cavity and the cyclic wind pressure to not exceed 0.08 seconds.
  - 2. Maximum differential between the cavity and the cyclic wind pressure to not exceed 50 percent of the maximum test pressure.

Retain first paragraph below for DBVC for compliance with voluntary standard AAMA 509, which also requires testing to ASTM E283/E283M, ASTM E330/E330M, ASTM E331, and AAMA 501.1.

- I. Provide DBVC system [with V-axis classification number greater than or equal to W-axis classification number] <Insert V-axis, W-axis> in accordance with AAMA 509.
- J. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

Differential values in "Temperature Change" Subparagraph below (for aluminum in particular) are suitable for most of the United States.

- 1. Temperature Change: [120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces] <Insert temperature range>.

Retain "Fire-Resistance Ratings" Paragraph below only if products specified are part of a fire-resistance-rated assembly. Indicate rating, testing agency, and testing agency's design designation on Drawings.

- K. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

Retain "Fire Propagation Characteristics" Paragraph below if required. Tested products are not available from all manufacturers.

- L. Fire Propagation Characteristics: MCM system passes NFPA 285 testing.

## 2.2 METAL COMPOSITE MATERIAL (MCM) WALL PANELS

Copy this article re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

- A. Metal Composite Material (MCM) Wall Panels: Provide MCM panels fabricated from two metal facings bonded to a solid, extruded thermoplastic core.
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  - 2. Core: [FR] [PE].

3. Panel Thickness: [**0.118 inch (3 mm)**] [**0.157 inch (4 mm)**] [**0.236 inch (6 mm)**] [**As indicated on Drawings**].
4. Bond Strength: **22.5 in-lb/in.** (100 N x mm/mm) when tested for bond integrity in accordance with ASTM D1781.
5. Fire Performance: Flame-spread index less than [**25**] [**75**] and smoke-developed index less than 450, in accordance with ASTM E84 or UL 723.

In "Perforated Panels" Subparagraph below, retain "45" option for exterior panels and "65" for interior panels.

6. Perforated Panels: [**Geometric**] [**Slotted**] **<Insert pattern>**, maximum [**45**] [**65**] percent open. [**Locations as indicated on Drawings.**]

B. MCM Panel Materials:

1. Aluminum-Faced Panels **<Insert drawing designation>**: ASTM B209 [**alloy as standard with manufacturer, temper as required to suit finish and forming operations**] [**3003, H14**] [**5005, H14**] **<Insert alloy, temper>** with [**0.020-inch- (0.50-mm-)**] [**0.032-inch- (0.81-mm-)**] thick, aluminum sheet facings.
  - a. Exterior Finish: [**Two-coat fluoropolymer**] [**Three-coat fluoropolymer**] [**Mica fluoropolymer**] [**Metallic fluoropolymer**] [**FEVE fluoropolymer**] [**Clear anodized**] [**Color anodized**] **<Insert finish>**.
    - 1) Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] **<Insert color>**.
2. Steel-Faced Panels **<Insert drawing designation>**:
  - a. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, **G90 (Z275)** coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, **Class AZ50 (Class AZM150)** coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    - 1) Exterior Finish: [**Two-coat fluoropolymer**] [**Three-coat fluoropolymer**] [**Mica fluoropolymer**] [**Metallic fluoropolymer**] [**FEVE fluoropolymer**] **<Insert finish>**.
      - a) Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] **<Insert color>**.

2.3 METAL COMPOSITE MATERIAL (MCM) SYSTEM **<Insert drawing designation>**

Insert drawing designation. Use these designations on Drawings to identify each product.

- A. PER MCM System: Provide factory-formed and -assembled, MCM panels formed into profile for PER system installation, drained at horizontal joints and at base of wall. Include attachment

assembly components[, **panel stiffeners**], and accessories required for compartmentalized and weathertight system.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

- B. DBVC MCM System: Provide factory-formed and -assembled, MCM panels formed into profile for DBVC system installation, drained at horizontal joints and at base of wall. Include attachment assembly components[, **panel stiffeners**], and accessories required for weathertight system.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

- C. Dry-Seal Barrier MCM System: Provide factory-formed and -assembled, MCM panels formed into profile for dry-seal barrier system installation. Include attachment assembly components[, **panel stiffeners**], and accessories required for weathertight system.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

- D. Wet-Seal Barrier MCM System: Provide factory-formed and -assembled, MCM panels formed into profile for wet-seal barrier system installation. Include attachment assembly components[, **panel stiffeners**], sealants, and accessories required for weathertight system.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

- E. System Panel Depth: [**1 inch (25 mm)**] [**1-1/2 inches (38 mm)**] [**1-3/4 inches (44 mm)**] [**2 inches (51 mm)**] [**As indicated by manufacturer's designations**] [**As indicated on drawings**] **<Insert depth>**.

- F. Attachment Assembly Components: [**Manufacturer's standard**] [**Clips**] [**Tracks**] [**Channels**] **<Insert method>** formed from [**extruded aluminum**] [**material compatible with panel facing**].

Identification mark in "Labeling" Subparagraph below is required by the IBC.

- G. Labeling: Comply with labeling requirement of applicable building code.

## 2.4 ACCESSORIES

- A. Metal Subframing and Furring: ASTM C955 cold-formed, metallic-coated steel sheet ASTM A653/A653M, **G90 (Z275)** hot-dip galvanized coating designation or ASTM A792/A792M, **Class AZ50 (Class AZM150)** aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of MCM system.

Retain system accessories, flashing, and trim as required and coordinate with those specified in Section 076200 "Sheet Metal Flashing and Trim."

- B. System Accessories: Provide components required for a complete, weathertight wall system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of MCM panels unless otherwise indicated.



- C. Flashing and Trim: Provide flashing and trim formed from same material as MCM 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 MCM panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Use gasketed or approved coated fasteners between dissimilar metals.
  - 1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
  - 2. Steel Panels: Use stainless steel fasteners.
  - 3. Provide exposed fasteners with heads matching color of MCM panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in MCM panels and remain weathertight; and as recommended in writing by MCM system manufacturer.

## 2.5 FABRICATION

- A. Fabricate and finish MCM panels at the factory, by panel manufacturer's standard procedures and processes, as necessary to fulfill indicated panel performance requirements demonstrated by laboratory testing.
- B. Shop-fabricate MCM systems and accessories by fabricator's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with requirements of MCM panel manufacturer, of indicated system profiles, and with dimensional and structural requirements.
  - 1. Fabricate panels to dimensions indicated on Drawings based on an assumed design temperature of **70 deg F (21 deg C)**. Allow for ambient temperature range at time of fabrication.
  - 2. Formed MCM panel lines, breaks, and angles to be sharp and straight, with surfaces free from warp or buckle.
  - 3. Fabricate panels with sharply cut edges and no displacement of face sheet or protrusion of core.

Retain first subparagraph below if gaskets or sealants are factory installed.

- 4. Fabricate MCM 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.
- 5. Attach routed-and-turned panel flanges to **[perimeter extrusions] [panel clips]** with manufacturer's standard **[fasteners] [structural silicone adhesive]**.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

## 2.6 FINISHES

A. Coil-Coated [**Aluminum**] [**Steel**] Finish:

In "PVDF Fluoropolymer" or "FEVE Fluoropolymer" Subparagraph below, retain one finish. Verify availability of finishes for products specified. If retaining more than one finish, indicate location of each on Drawings or by inserts. To obtain a proprietary finish system, insert names of coating manufacturers and products.

1. PVDF Fluoropolymer: AAMA 2605, [**two-coat**] [**three-coat**] [**two-coat, with suspended mica flakes,**] [**three-coat, with suspended metallic flakes,**] fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat[ **and clear topcoat**]. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. FEVE Fluoropolymer: AAMA 2605, [**one-coat**] [**two-coat**] [**three-coat**] [**two-coat, with suspended mica flakes,**] [**three-coat, with suspended metallic flakes,**] fluoropolymer finish containing 100 percent FEVE resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

## PART 3 - EXECUTION

## 3.1 INSTALLATION OF MCM SYSTEM

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, MCM system supports, and other conditions affecting performance of the Work.
- B. General: Install MCM system in accordance with system manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor MCM system securely in place, with provisions for thermal and structural movement.
- C. Attachment Assembly, General: Install attachment assembly required to support MCM panels and to provide a complete weathertight wall system, including tracks, drainage channels, anchor channels, perimeter extrusions[, **and panel clips**].
  1. Install subframing, furring, and other panel support members and anchorages in accordance with ASTM C955.
  2. Install support system at locations, at spacings, and with fasteners recommended by MCM system manufacturer to meet listed performance requirements.

Retain "PER MCM System," "DBVC MCM System," "Dry-Seal MCM System," or "Wet-Seal MCM System" Paragraph below.

- D. PER MCM System: Install vertical [**tracks**] [**drain channels**] and horizontal [**tracks**] [**channels**] providing compartmentalization at locations, at spacings, and with fasteners recommended by system manufacturer.

1. Attach MCM panels by interlocking panel **[clips]** **[perimeter extrusion]** into **[tracks]** **[channels]** **[ in a sequential series]**.
  2. Insert matching MCM spline into **[tracks]** **[channels]** at joint reveal locations.
- E. DBVC MCM System: Install vertical **[tracks]** **[drain channels]** and horizontal **[tracks]** **[channels]** at locations, at spacings, and with fasteners recommended by system manufacturer.
1. Attach MCM panels by interlocking panel **[clips]** **[perimeter extrusion]** into **[tracks]** **[channels]** **[ in a sequential series]**.
  2. Insert matching MCM spline into **[tracks]** **[channels]** at joint reveal locations.
- F. Dry-Seal MCM System: Attach MCM panels by interlocking panel **[clips]** **[perimeter extrusion]** into **[tracks]** **[channels]** **[ in a sequential series]**.
1. Seal horizontal and vertical joints between adjacent MCM panels with manufacturer's standard gaskets.
- G. Wet-Seal MCM System: Attach MCM panels by interlocking panel **[clips]** **[perimeter extrusion]** into **[tracks]** **[channels]** **[ in a sequential series]**.
1. Seal horizontal and vertical joints between adjacent MCM panels with sealant backing and sealant in accordance with requirements specified in Section 079200 "Joint Sealants."
- H. Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install accessory components required for a complete MCM system assembly including trim, copings, corners, seam covers, flashings, **[sealants]****[gaskets]**, fillers, closure strips, and similar items. Provide types indicated by MCM system manufacturer.
- I. 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.
- J. Remove temporary protective coverings and strippable films as MCM panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, clean finished surfaces as recommended by MCM panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074213.23

## SECTION 074213.13 - FORMED METAL WALL PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Concealed-fastener, lap-seam metal wall panels.

#### 1.2 ACTION SUBMITTALS

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

##### B. Shop Drawings: 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.

##### C. Samples: For each type of metal panel indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

##### A. Product test reports.

##### B. Warranties: Samples of special warranties.

#### 1.4 CLOSEOUT SUBMITTALS

##### A. Maintenance data.

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 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. 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. 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 E1592:
  - 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 E283 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 E331 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 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Corrugated-Profile, Concealed-Fastener Metal Wall Panels: Formed with alternating curved ribs spaced at 2.75 inches o.c. across width of panel with flush joint between panels.
  - 1. Basis of Design: Subject to compliance with requirements, provide the product indicated on the Drawings or provide a comparable product by one of the following:
    - a. AEP Span a brand of ASC Profiles LLC, a part of BlueScope.

- b. CENTRIA, a Nucor Brand.
  - c. MBCI; Cornerstone Building Brands.
  - d. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
- 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
  - a. Nominal Thickness: 0.028 inch.
  - b. Texture: Smooth.
  - c. Exterior Finish: Two-coat fluoropolymer.
  - d. Color: As indicated on Drawings.
- 3. Panel Coverage: 16-5/8 inches.
- 4. Panel Height: 7/8 inch.

## 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal 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; 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

## 2.4 FABRICATION

- A. 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.

## 2.5 FINISHES

- A. Panels and Accessories:
  1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.
  2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

# PART 3 - EXECUTION

## 3.1 PREPARATION

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

## 3.2 INSTALLATION

- A. 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.

B. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommended 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.

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.

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 as indicated. Install work with laps, joints, and seams that are permanently watertight.

### 3.3 CLEANING

- 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.

END OF SECTION 07 42 13.13



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## SECTION 074246 - FIBER-CEMENT WALL PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Exterior panelized fiber-cement rainscreen cladding system and accessories.

- B. Refer to Section 018113 "Sustainable Design Requirements" sections for applicable sustainability requirements.

#### 1.2 DEFINITIONS

- A. DBVR: Drained and back-ventilated rainscreen system; designed to drain and dry cavity entering water through drainage channels, weeps, and air ventilation.

#### 1.3 ACTION SUBMITTALS

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

- B. Samples: For siding, soffit, and trim including related accessories.

- C. Shop drawings:

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.

- B. Product test reports.

- C. Research/evaluation reports.

- D. Sample warranty.

#### 1.5 QUALITY ASSURANCE

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

**1.6 FIELD CONDITIONS**

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

**1.7 COORDINATION**

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

**1.8 WARRANTY**

- A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Fiber-Cement Siding: 50 years from date of Substantial Completion.
  - 2. Warranty Period for Fiber-Cement Siding and Trim Finish: 15 years from date of Substantial Completion.

**PART 2 - PRODUCTS****2.1 PERFORMANCE REQUIREMENTS**

- A. Physical Performance: Provide fiber-cement panel system in accordance with ASTM C1186, Type A, Grade II.
  - 1. Wet Flexural Strength: Result: 1418 psi, Lower Limit: 1015 psi.
  - 2. Water Tightness: No water droplets observed on any specimen.
  - 3. Freeze-Thaw: No damage or defects observed.
  - 4. Warm Water: No evidence of cracking, delamination, swelling, or other defects observed.
  - 5. Heat-Rain: No crazing, cracking, or other deleterious effects, or surface or joint changes observed in any specimen.
- B. Structural Performance: Provide fiber-cement panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E330/E330M:
  - 1. Design Wind Loads: As indicated on Drawings
  - 2. Other Design Loads: As indicated on Drawings.
  - 3. Deflection Limits: For wind loads, panel deflection no greater than L/120 of the span.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

- D. Air Leakage: 1.53 cfm/sq. ft. or less in accordance with AAMA5094.
- E. Water Penetration under Static Pressure: No water penetration to room side of assembly when tested for 15 minutes in accordance with ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- F. Fire Propagation Characteristics: Fiber-cement panel wall assembly passes NFPA 285.

## 2.1 MANUFACTURERS

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product wall panel system indicated on the Drawings or comparable product system by one of the following:
  - a. Cembrit.
  - b. MEW USA Inc.
  - c. Swisspearl.
- B. Source Limitations: Obtain fiber cement panel products from a single source manufacturer.

## 2.2 FIBER-CEMENT WALL PANELS

- A. Fiber-Cement Wall Panel Systems: Provide factory-formed and -assembled, fiber-cement wall panels fabricated from a pressed, stamped, and autoclaved mix of portland cement, fly ash, silica, recycled rejects, and wood fiber bundles; formed into profile for installation method indicated. Include attachment assembly components and accessories required for weathertight system.
- B. Moderately Textured, Wood Plank Fiber-cement Wall Panels: Riftsawn.
  - 1. Panel Dimensions: 17-7/8 by 119-5/16 inches.
  - 2. Panel Thickness: 5/8 inch.
  - 3. Panel: Factory sealed on all six sides.
  - 4. Profiles: Wood plank texture with 3/8-inch grooves, running lengthwise as indicated on Drawings.
  - 5. Color: As indicated on Drawings.
  - 6. Accessory Components: Manufactured corners with 3-1/2-inch returns.

## 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet with ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of fiber-cement panel system.

1. Basis-of-Design Product: Nichiha Architectural Wall Panels; Ultimate Horizontal Starter Track Retain panel accessories, flashing, and trim as required and coordinate with those specified in Section 076200 "Sheet Metal Flashing and Trim."
- 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 fiber-cement panels unless otherwise indicated.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide Nichiha Architectural Wall Panels; Ultimate Clip System
- C. Flashing and Trim: Provide PVC-coated aluminum flashing and trim 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.
- D. Panel Fasteners: Provide corrosion-resistant fasteners as required for construction method used.
- E. Panel Sealants: ASTM C920, Class 35; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in fiber-cement panels and remain weathertight; and as recommended in writing by fiber-cement panel manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, fiber-cement panel supports, and other conditions affecting performance of the Work.
  1. 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 assemblies penetrating fiber-cement panels to verify actual locations of penetrations relative to seam locations of fiber-cement 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 in accordance with fiber-cement panel manufacturer's written instructions.

### 3.3 FIBER -CEMENT PANEL INSTALLATION

- A. General: Install fiber-cement panels in accordance with manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor fiber-cement panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Shim or otherwise plumb substrates receiving fiber-cement panels.
  - 2. Flash or seal fiber-cement panels at perimeter of all openings. Fasten flashing with manufacturer-approved fasteners. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by fiber-cement 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 fiber-cement panel work proceeds.
  - 6. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
  - 1. Fiber-cement Panels: Use hot-dip galvanized, ceramic-coated, or stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Attachment Assembly, General: Install attachment assembly required to support fiber-cement wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
  - 1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
- D. Panel Installation: Attach fiber-cement wall panels to supports at locations, at spacings, and with fasteners recommended in writing by manufacturer to achieve performance requirements specified.
  - 1. DBVR Rainscreen System: Install using manufacturer's standard assembly with horizontal channel that provides support and secondary drainage assembly, draining at base of wall. Attach fiber-cement wall panels by placing panel clips to supports at locations, at spacings, and with fasteners recommended in writing by manufacturer.
    - a. Track-Support Installation: Install support assembly at locations, at spacings, and with fasteners recommended in writing by manufacturer. Use manufacturer's standard horizontal tracks or drain channels that provide support and secondary drainage assembly.
    - b. Panel Installation:
      - 1) Attach fiber-cement wall panels by interlocking panel edges with manufacturer's standard clips.
    - c. Joint Sealing: Seal all joints in accordance with AAMA 509. Do not apply sealants to joints unless otherwise indicated.

- E. 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 fiber-cement panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by fiber-cement panel manufacturer; or, if not indicated, provide types recommended in writing by fiber-cement system manufacturer.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, or SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
  - 1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
  - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

### 3.4 ERECTION TOLERANCES

- A. Shim and align fiber-cement wall panel units within installed tolerance of 1/4 inch in 20 ft., non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

### 3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings, if any, as fiber-cement panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of fiber-cement panel installation, clean finished surfaces as recommended by fiber-cement panel manufacturer. Maintain in a clean condition during construction.
- B. After fiber-cement panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace fiber-cement panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074646

SECTION 074293 - SOFFIT PANELS – **NOT YET EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal soffit panels.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.

1.3 ACTION SUBMITTALS

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

- B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>

- C. Shop Drawings: 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.

- D. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

- B. Warranties: Samples of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 WARRANTY

When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws.



- 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.

Verify available warranties and warranty periods for metal panels.

1. 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.

Verify available warranties for metal panel finishes and insert number in "Finish Warranty Period" Subparagraph below. A 20-year period is available for fluoropolymer finish and is the maximum included with manufacturers' published data; a 10-year period is usually available for siliconized polyester. Longer periods for premium finishes may be available.

1. Finish Warranty Period: [**20**] [**10**] <Insert number> years from date of Substantial Completion.

Insert requirements for special weathertightness warranty if needed; panel manufacturers do not typically offer such warranties on wall systems.

## PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

### 2.1 PERFORMANCE REQUIREMENTS

- A. <Double click to insert sustainable design text for recycled content.>
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
  2. Other Design Loads: [**As indicated on Drawings**] <Insert loads>.
  3. Deflection Limits: For wind loads, no greater than [**1/180**] [**1/240**] <Insert deflection> of the span.
  4. <Insert serviceability requirements>.

Revise rate of air leakage in "Air Infiltration" Paragraph below to suit Project.

- C. Air Infiltration: Air leakage of not more than **[0.06 cfm/sq. ft. (0.3 L/s per sq. m)]** **<Insert rate>** when tested according to ASTM E283 at the following test-pressure difference:

Value in first option in "Test-Pressure Difference" Subparagraph below is equivalent to a 25-mph (40-km/h) wind and is ASTM E283 default. Products tested to value in second option below, equivalent to a 50-mph (80-km/h) wind, are widely available. Revise to suit Project.

1. Test-Pressure Difference: **[1.57 lbf/sq. ft. (75 Pa)]** **[6.24 lbf/sq. ft. (300 Pa)]**.

ASTM E331 in "Water Penetration under Static Pressure" Paragraph below indicates that "water contained within drainage flashings, gutters, and sills is not considered failure."

- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

Value in first option in "Test-Pressure Difference" Subparagraph below is equivalent to a 34-mph (55-km/h) wind and is ASTM E331 default. Products tested to value in second option below, equivalent to a 50-mph (80-km/h) wind, are widely available. Revise to suit Project.

1. Test-Pressure Difference: **[2.86 lbf/sq. ft. (137 Pa)]** **[6.24 lbf/sq. ft. (300 Pa)]**.

- E. 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.

Differential values (for aluminum in particular) in "Temperature Change (Range)" Subparagraph below are suitable for most of the U.S.; revise to suit Project.

1. Temperature Change (Range): **[120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces]** **<Insert temperature range>**.

## 2.2 METAL SOFFIT PANELS

Some metal soffit panels can be used for fasciae, mansards, and equipment screens, as well as for soffits; verify applications with manufacturers.

- A. 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]** **[roof]** panels.
  1. Finish: **[Match finish and color of metal wall panels]** **[Match finish and color of metal roof panels]** **[As indicated on Drawings]**.

Retain "Sealant" Subparagraph below if required. Verify availability with manufacturers.

2. Sealant: Factory applied within interlocking joint.

Retain "Metal Soffit Panels" Paragraph above or one or more metal soffit panel paragraphs below. Delete paragraphs below if retaining paragraph above.

Copy paragraphs below and re-edit for each product.

Insert drawing designation for each product required. Use these designations on Drawings to identify each product.

- C. Flush-Profile Metal Soffit Panels <Insert drawing designation>: [Solid] [Perforated] panels formed with vertical panel edges and [intermediate stiffening ribs symmetrically spaced] [a flat pan] between panel edges; with flush joint between panels.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
  2. Material: Same material, finish, and color as metal [wall] [roof] panels.

Retain "Material" Subparagraph above or one of two sheet subparagraphs below.

3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    - a. Nominal Thickness: [0.022 inch (0.56 mm)] [0.028 inch (0.71 mm)] [0.034 inch (0.86 mm)] [0.040 inch (1.02 mm)] [0.052 inch (1.32 mm)].
    - b. Exterior Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Siliconized polyester] <Insert finish>.
    - c. Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range] <Insert color>.
  4. Aluminum Sheet: Coil-coated sheet, ASTM B209 (ASTM B209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
    - a. Thickness: [0.032 inch (0.81 mm)] [0.040 inch (1.02 mm)].
    - b. Surface: [Smooth, flat] [Embossed] finish.
    - c. Exterior Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Siliconized polyester] <Insert finish>.
    - d. Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range] <Insert color>.
  5. Panel Coverage: [8 inches (203 mm)] [12 inches (305 mm)] [16 inches (406 mm)] [20 inches (508 mm)] <Insert dimension>.
  6. Panel Height: [0.875 inch (22 mm)] [1.0 inch (25 mm)] [1.5 inches (38 mm)] [3.0 inches (76 mm)] <Insert dimension>.
- D. Reveal-Joint-Profile Metal Soffit Panels <Insert drawing designation>: [Solid] [Perforated] panels formed with vertical panel edges and [intermediate stiffening ribs symmetrically spaced] [a flat pan] between panel edges; with recessed reveal joint between panels.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
  2. Material: Same material, finish, and color as metal [wall] [roof] panels.

Retain "Material" Subparagraph above or one of two sheet subparagraphs below.

3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, **G90 (Z275)** coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, **Class AZ50 (Class AZM150)** coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    - a. Nominal Thickness: [**0.022 inch (0.56 mm)**] [**0.028 inch (0.71 mm)**] [**0.034 inch (0.86 mm)**] [**0.040 inch (1.02 mm)**] [**0.052 inch (1.32 mm)**].
    - b. Exterior Finish: [**Two-coat fluoropolymer**] [**Three-coat fluoropolymer**] [**Siliconized polyester**] <Insert finish>.
    - c. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <Insert color>.
  4. Aluminum Sheet: Coil-coated sheet, **ASTM B209 (ASTM B209M)**, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
    - a. Thickness: [**0.032 inch (0.81 mm)**] [**0.040 inch (1.02 mm)**].
    - b. Surface: [**Smooth, flat**] [**Embossed**] finish.
    - c. Exterior Finish: [**Two-coat fluoropolymer**] [**Three-coat fluoropolymer**] [**Siliconized polyester**] <Insert finish>.
    - d. Color: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <Insert color>.
  5. Panel Coverage: [**8 inches (203 mm)**] [**12 inches (305 mm)**] [**16 inches (406 mm)**] [**20 inches (508 mm)**] <Insert dimension>.
  6. Panel Height: [**0.75 inch (19 mm)**] [**1.0 inch (25 mm)**] [**1.5 inches (38 mm)**] <Insert dimension>.
- E. V-Groove-Profile Metal Soffit Panels <Insert drawing designation>: [**Solid**] [**Perforated**] panels formed with vertical panel edges and [**intermediate stiffening ribs symmetrically spaced**] [**a flat pan**] between panel edges; with a V-groove joint between panels.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  2. Material: Same material, finish, and color as metal [**wall**] [**roof**] panels.

Retain "Material" Subparagraph above or one of two sheet subparagraphs below.

3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, **G90 (Z275)** coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, **Class AZ50 (Class AZM150)** coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
  - a. Nominal Thickness: [**0.022 inch (0.56 mm)**] [**0.028 inch (0.71 mm)**] [**0.034 inch (0.86 mm)**] [**0.040 inch (1.02 mm)**] [**0.052 inch (1.32 mm)**].
  - b. Exterior Finish: [**Two-coat fluoropolymer**] [**Three-coat fluoropolymer**] [**Siliconized polyester**] <Insert finish>.

- c. Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range] <Insert color>.
- 4. Aluminum Sheet: Coil-coated sheet, **ASTM B209** (**ASTM B209M**), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
  - a. Thickness: [**0.032 inch (0.81 mm)**] [**0.040 inch (1.02 mm)**].
  - b. Surface: [**Smooth, flat**] [**Embossed**] finish.
  - c. Exterior Finish: [**Two-coat fluoropolymer**] [**Three-coat fluoropolymer**] [**Siliconized polyester**] <Insert finish>.
  - d. Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range] <Insert color>.
- 5. Panel Coverage: [**6 inches (152 mm)**] [**12 inches (305 mm)**] [**14 inches (356 mm)**] <Insert dimension>.
- 6. Panel Height: [**0.375 inch (10 mm)**] [**0.44 inch (11 mm)**] [**0.50 inch (13 mm)**] [**0.625 inch (16 mm)**] <Insert dimension>.

## 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, **G90** (**Z275**) hot-dip galvanized coating designation or ASTM A792/A792M, **Class AZ50** (**Class AZM150**) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

Retain panel accessories, flashing, and trim as required and coordinate with those specified in Section 076200 "Sheet Metal Flashing and Trim."

- 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- (25-mm-)** 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 polyisobutylene compound sealant tape with release-paper backing; 1/8 inch (3 mm) thick.
  - 2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

## 2.4 FABRICATION

- A. 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.

Retain "On-Site Fabrication" Paragraph below to permit use of on-site, portable roll-forming equipment.

- 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.

Retain first paragraph below if gaskets or sealants are factory installed.

- 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.

## 2.5 FINISHES

- A. Panels and Accessories:

Retain one fluoropolymer or siliconized-polyester finish from subparagraphs below. Verify availability of finishes for products specified. If retaining more than one, indicate location of each on Drawings or by inserts. To obtain a proprietary finish system, insert names of coating manufacturers and products. Retain AAMA 621 for steel facings; AAMA 2605 for aluminum facings.

- 1. Two-Coat Fluoropolymer: [AAMA 621] [AAMA 2605]. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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 621] [AAMA 2605]. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

Finish in "Concealed Finish" Subparagraph below is frequently used as a factory finish for interior surfaces.

4. Concealed Finish: White or light-colored acrylic or polyester backer finish.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

Furring channels in "Soffit Framing" Subparagraph below must be wire tied to supports in most fire-resistance-rated assemblies. Verify requirements of assemblies and revise subparagraph to suit Project.

1. Soffit Framing: Wire tie[ **or clip**] furring channels to supports[, **as required to comply with requirements for assemblies indicated**].

### 3.2 INSTALLATION

- A. Metal Soffit 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.

Retain "Watertight Installation" Paragraph below for hydrostatic (watertight) panel installation; delete for perforated panel installations or if not required.

- B. Watertight Installation:



1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommended 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 (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- 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.
- 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 as indicated. Install work with laps, joints, and seams that are permanently watertight.

### 3.3 CLEANING

- 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.

END OF SECTION 074293



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## SECTION 075423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Adhered thermoplastic polyolefin (TPO) roofing system.
  - 2. Roof insulation.
  - 3. Walkways.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 DEFINITIONS

- A. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. 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 termination details.
  - 3. Flashing details at penetrations.
  - 4. Tapered insulation layout, thickness, and slopes.
  - 5. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Samples: For the following products:
  - 1. Roof membrane and flashings, of color required.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
    - 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.
- B. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- C. Research reports.
- D. Field Test Reports:
1. Concrete internal relative humidity test reports.
  2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
- E. Field quality-control reports.
- F. Sample warranties.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance data.
- 1.6 QUALITY ASSURANCE
- A. 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.
- 1.7 WARRANTY
- A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
1. Special warranty shall bind installer for the first two years of the warranty.
  2. Warranty Period: 30 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. 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:
- C. SPRI's Directory of Roof Assemblies 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 SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
  - 1. Wind Load: As indicated on Drawings.
- D. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class B; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

### 2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

- A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced, fabric-backed TPO sheet.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Firestone Building Products; UltraPly TPO Flex Adhered or a comparable product by one of the following:
    - a. Carlisle SynTec Incorporated.
    - b. Johns Manville; a Berkshire Hathaway company.
  - 2. Thickness: 60 mils, nominal.
  - 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. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

- D. Bonding Adhesive: Manufacturer's standard, water based.
- E. Slip Sheet: Manufacturer's standard, of thickness required for application.
- F. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. 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.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

## 2.4 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- B. Tapered Insulation: Provide factory-tapered insulation boards.
  - 1. Material: Match roof insulation.
  - 2. Minimum Thickness: 1/4 inch.
  - 3. Slope:
    - a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
    - b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

## 2.5 INSULATION ACCESSORIES

- A. Fasteners: Factory-coated steel fasteners with 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.
- B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
  - 1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
- C. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric; water permeable and resistant to UV degradation; type and weight as recommended by roofing system manufacturer for application.

## 2.6 WALKWAYS

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

## 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 concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.
    - a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with not less than three tests probes.
    - b. Submit test reports within 24 hours after performing tests.
  - 2. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
  - 3. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.

### 3.2 PREPARATION

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

### 3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, SPRI's Directory of Roof Assemblies listed roof 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.

### 3.4 INSTALLATION OF INSULATION

- 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 roof insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Wood Panel Decking:
  - 1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows.
    - a. 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.
    - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    - d. 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.
    - e. Fill gaps exceeding 1/4 inch with insulation.
    - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
  - 2. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to wood panel decks.
    - a. Fasten insulation according to requirements in SPRI's Directory of Roof Assemblies for specified Wind Uplift Load Capacity.
    - b. Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
  - 3. 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. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
    - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    - d. Fill gaps exceeding 1/4 inch with insulation.
    - e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    - f. Adhere each layer of insulation to substrate using adhesive according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

- 1) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

### 3.5 INSTALLATION OF ADHERED ROOF MEMBRANE

- 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.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- G. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- H. Seams: Clean seam areas, overlap roof membrane, 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.

### 3.6 INSTALLATION OF BASE FLASHING

- 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.



**3.7 INSTALLATION OF WALKWAYS**

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

**3.8 FIELD QUALITY CONTROL**

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

**3.9 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 system, 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.

END OF SECTION 075423

## SECTION 076200 - SHEET METAL FLASHING AND TRIM

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. 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 joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
5. Include details of termination points and assemblies.
6. Include details of roof-penetration flashing.
7. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.

C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

#### 1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

## 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
  - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

## 1.5 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. 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, including cleats, anchors, and fasteners, 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: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
  - 1. Design Wind Load: As indicated on Drawings.
- D. 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 B209, 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. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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. 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. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
  - 1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).

## 2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Self-Adhering, High-Temperature Sheet Underlayment: 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 in accordance with underlayment manufacturer's written instructions.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. GCP Applied Technologies Inc. (formerly Grace Construction Products).
    - b. Henry Company.
    - c. Owens Corning.
    - d. Polyguard Products, Inc.
    - e. Protecto Wrap Company.
  - 2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
  - 3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.
- C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

## 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, 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.
  - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
  - 3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
- C. Solder:
  - 1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane 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 C1311, 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. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
  - 1. Material: Aluminum, 0.024 inch thick.
  - 2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  - 3. Finish: With manufacturer's standard color coating.

## 2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. 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.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. 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.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

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

F. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. 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.
3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

## 2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters:

1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in minimum 96-inch-long sections.
3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness.

4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
5. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen Wire-ball downspout strainer Valley baffles.
6. Gutters with Girth up to 15 Inches: Fabricate from the following materials:
  - a. Aluminum: 0.032 inch thick.
- B. Downspouts: Fabricate rectangular downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Fabricate from the following materials:
  - a. Aluminum: 0.024 inch thick.
- C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:
  1. Aluminum: 0.032 inch thick.
- D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, exterior flange trim,. Fabricate from the following materials:
  1. Aluminum: 0.032 inch thick.
- E. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
  1. Aluminum: 0.040 inch thick.

## 2.7 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. Fabricate from the following materials:
  - a. Aluminum: 0.050 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 interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners. Fabricate from the following materials:
  - a. Aluminum: 0.050 inch thick.
- C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
  1. Aluminum: 0.040 inch thick.
- D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
  1. Aluminum: 0.032 inch thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

F. Roof-Drain Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.016 inch thick.

## 2.8 WALL SHEET METAL FABRICATIONS

A. 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.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF UNDERLAYMENT

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lap joints not less than 2 inches.

B. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

C. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lap joints not less than 4 inches.

### 3.2 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.



1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
  3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
  4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
  5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
  6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
  8. Do not field cut sheet metal flashing and trim by torch.
- 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.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
  2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
  3. 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.
  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.
1. Stainless Steel Soldering:
    - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
    - b. Promptly remove acid-flux residue from metal after tinning and soldering.
    - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

### 3.3 INSTALLATION OF ROOF-DRAINAGE SYSTEM

- A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters:
  - 1. Join sections with joints sealed with sealant.
  - 2. Provide for thermal expansion.
  - 3. Attach gutters at eave or fascia to firmly anchor them in position.
  - 4. Provide end closures and seal watertight with sealant.
  - 5. Slope to downspouts.
  - 6. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.
  - 7. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. Downspouts:
  - 1. Join sections with 1-1/2-inch telescoping joints.
  - 2. Provide hangers with fasteners designed to hold downspouts securely to walls.
  - 3. Locate hangers at top and bottom and at approximately 60 inches o.c.
  - 4. Provide elbows at base of downspout to direct water away from building.
  - 5. Connect downspouts to underground drainage system.
- D. Splash Pans:
  - 1. Install where downspouts discharge on low-slope roofs.
  - 2. Set in elastomeric sealant compatible with the substrate.
- E. Parapet Scuppers:
  - 1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
  - 2. Seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.
- F. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below scupper discharge.

### 3.4 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
  - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
  - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.
  - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
- 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.
  1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
  2. Extend counterflashing 4 inches over base flashing.
  3. Lap counterflashing joints minimum of 4 inches.
- 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.

### 3.5 INSTALLATION OF WALL FLASHINGS

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

### 3.6 INSTALLATION TOLERANCES

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

### 3.7 CLEANING

- 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.

**3.8 PROTECTION**

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. 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, as determined by Architect.

END OF SECTION 076200

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SECTION 077100 - ROOF SPECIALTIES – **NOT YET EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge specialties.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.

B. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for recycled content.>

Retain "Shop Drawings" Paragraph below for Work that involves custom fabrication or if manufacturer's product data are inadequate.

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.

D. Samples: For each type of roof specialty and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For tests performed by a qualified testing agency.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are **[FM Approvals listed for specified class] [and] [SPRI ES-1 tested to specified design pressure]**.

1.6 WARRANTY

Retain "Roofing-System Warranty" Paragraph below when roof specialties are required to be included in a roofing-membrane manufacturer's system warranty; coordinate with Project roofing-membrane Section.

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section **<Insert Section number> "<Insert roof Section title>."**

Retain "Special Warranty on Painted Finishes" Paragraph below for factory-coated metal. Delete if metal is left uncoated or field finished. Coordinate with finishes retained in Part 2.

- B. 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 Delta E units when tested in accordance with ASTM D2244.
- b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

Verify available warranties and warranty periods for finishes with manufacturers listed in Part 2 articles. Twenty-year or longer periods are for fluoropolymer finishes and are included with manufacturers' published data; longer periods for premium finishes may be available.

2. Finish Warranty Period: **[20] [10] <Insert number>** years from date of Substantial Completion.

PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

## 2.1 PERFORMANCE REQUIREMENTS

- A. [<Double click to insert sustainable design text for recycled content.>](#)

Retain "FM Approvals' Listing" Paragraph below if Project is FM Global insured or if FM Approvals' requirements set a minimum quality standard. Coordinate requirements of FM Approvals' classification with other requirements in this Section. Verify availability of copings or roof-edge specialties with these classifications.

- B. FM Approvals' Listing: Manufacture and install [copings] [roof-edge specialties] that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, [Class 1-60] [Class 1-75] [Class 1-90] [Class 1-105] [Class 1-120] <Insert class>. Identify materials with FM Approvals' markings.

Retain "SPRI Wind Design Standard" Paragraph below if Project is governed by the International Building Code (IBC) or if SPRI ES-1 sets a minimum quality standard. Coordinate requirements in SPRI ES-1 with other requirements in this Section. Verify availability of copings or roof-edge specialties that meet these requirements. See Evaluations for additional information on SPRI ES-1 testing programs.

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

Indicate wind design pressure on Drawings or in "Design Pressure" Subparagraph below. Design pressure is determined by formulas in the IBC or SPRI ES-1, as applicable, that account for basic wind speed, exposure factor, building height, building importance factor, and pressure coefficient that incorporates a gust factor.

1. Design Pressure: [As indicated on Drawings] <Insert design pressure>.
- 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.

Differential values in "Temperature Change (Range)" Subparagraph below (for aluminum in particular) are suitable for most of the United States.

1. Temperature Change (Range): [120 deg F (67 deg C), ambient; 180 deg F (100 deg C)] <Insert temperature range>, material surfaces.

## 2.2 COPINGS

- A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding [12 feet (3.6 m)] <Insert dimension>, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)



2. Metallic-Coated Steel Sheet Coping Caps: Zinc-coated (galvanized) steel, nominal **[0.028-inch (0.71-mm) thickness]** **[0.034-inch (0.86-mm) thickness]** **[thickness as required to meet performance requirements]** **<Insert thickness>**.
  - a. Surface: **[Smooth, flat]** **[Embossed]** finish.
  - b. Finish: **[Two-coat fluoropolymer]** **[Three-coat fluoropolymer]** **[Two-coat mica fluoropolymer]** **[Three-coat metallic fluoropolymer]** **<Insert finish>**.
  - c. Color: **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color>**.
3. Formed Aluminum Sheet Coping Caps: Aluminum sheet, **[0.040 inch (1.02 mm) thick]** **[0.050 inch (1.27 mm) thick]** **[0.063 inch (1.60 mm) thick]** **[thickness as required to meet performance requirements]** **<Insert thickness>**.
  - a. Surface: **[Smooth, flat]** **[Embossed]** finish.
  - b. Finish: **[Mill]** **[Two-coat fluoropolymer]** **[Three-coat fluoropolymer]** **[Two-coat mica fluoropolymer]** **[Three-coat metallic fluoropolymer]** **[Clear anodic]** **[Color anodic]** **<Insert finish>**.

Delete "Color" Subparagraph below for mill and clear anodic finishes. First four options are examples of color anodic finishes and may vary in color range and availability among manufacturers.

- c. Color: **[Light bronze]** **[Medium bronze]** **[Dark bronze]** **[Black]** **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color>**.
4. Formed Copper Sheet Coping Caps: Copper sheet, **[20 oz./sq. ft. (0.68 mm thick)]** **[weight (thickness) as required to meet performance requirements]** **<Insert weight (thickness)>**.
  - a. Copper Finish: **[Non-patinated, mill]** **[Pre-patinated dark brown]** **[Pre-patinated verdigris]** **<Insert finish>**.

Some manufacturers do not offer first two options in "Corners" Subparagraph below; if required, verify availability with manufacturers.

5. Corners: Factory mitered and **[soldered]** **[continuously welded]** **[mechanically clinched and sealed watertight]**.
6. Coping-Cap Attachment Method: **[Snap-on]** **[or]** **[face leg hooked to continuous cleat with back leg fastener exposed]**, fabricated from coping-cap material.

Retain "Snap-on Coping Anchor Plates" or "Face-Leg Cleats" Subparagraph below and coordinate with coping-cap attachment method selected.

- a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, **12 inches (300 mm)** wide, with integral cleats.

Retain first option in "Face-Leg Cleats" Subparagraph below for anchoring aluminum and galvanized-steel coping caps; retain second for anchoring copper coping caps.

- b. Face-Leg Cleats: Concealed, continuous **[galvanized-steel sheet]** **[stainless steel]**.

## 2.3 ROOF-EDGE SPECIALTIES

Retain first paragraph below for a two-piece, canted, roof-edge fascia or gravel-stop fascia consisting of a snap-on or compression-clamped metal fascia cover over a metal cant or water dam.

Copy first paragraph below and re-edit for each product.

- A. Canted Roof-Edge **[Fascia]** **[and]** **[Gravel Stop]**: Manufactured, two-piece, roof-edge fascia consisting of **[snap-on]** **[compression-clamped]** metal fascia cover in section lengths not exceeding **[12 feet (3.6 m)]** **<Insert dimension>** and a continuous formed galvanized-steel sheet cant, **0.028 inch (0.71 mm)** thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain one of two fascia covers subparagraphs below. Retain thickness of fascia cover that meets performance requirements and has the rigidity to suit Project.

2. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal **[0.028-inch (0.71-mm) thickness]** **[0.034-inch (0.86-mm) thickness]** **[thickness as required to meet performance requirements]** **<Insert thickness>**.
  - a. Surface: **[Smooth, flat]** **[Embossed]** finish.
  - b. Finish: **[Two-coat fluoropolymer]** **[Three-coat fluoropolymer]** **[Two-coat mica fluoropolymer]** **[Three-coat metallic fluoropolymer]** **<Insert finish>**.
  - c. Color: **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color>**.
3. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, **[0.040 inch (1.02 mm) thick]** **[0.050 inch (1.27 mm) thick]** **[0.063 inch (1.60 mm) thick]** **[thickness as required to meet performance requirements]** **<Insert thickness>**.
  - a. Surface: **[Smooth, flat]** **[Embossed]** finish.
  - b. Finish: **[Mill]** **[Two-coat fluoropolymer]** **[Three-coat fluoropolymer]** **[Two-coat mica fluoropolymer]** **[Three-coat metallic fluoropolymer]** **[Clear anodic]** **[Color anodic]** **<Insert finish>**.

Delete "Color" Subparagraph below for mill and clear anodic finishes. First four options are examples of color anodic finishes and may vary in color range and availability among manufacturers.

- c. Color: **[Light bronze]** **[Medium bronze]** **[Dark bronze]** **[Black]** **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color>**.

Some manufacturers do not offer first two options in "Corners" Subparagraph below; if required, verify availability with manufacturers.

4. Corners: Factory mitered and **[soldered]** **[continuously welded]** **[mechanically clinched and sealed watertight]**.
  5. Splice Plates: **[Concealed]** **[Exposed]**, of same material, finish, and shape as fascia cover.

Scuppers separate from roof-edge specialties are specified in "Roof-Edge Drainage Systems" Article.

6. Fascia Accessories: [Fascia extenders with continuous hold-down cleats] [Wall cap] [Soffit trim] [Overflow scuppers] [Overflow scuppers with perforated screens] [Spillout scuppers] [Downspout scuppers with integral conductor head and downspout adapters] [Downspout scuppers with integral conductor head and downspout adapters and perforated screens] <Insert description>.

Retain "Roof-Edge Fascia" Paragraph below for a two-piece, roof-edge fascia consisting of a snap-on fascia cover over a continuous anchor bar; revise to suit Project. Receiver typically secures a downturned single-ply roofing membrane and is capable of developing substantial uplift resistance.

- B. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding [12 feet (3.6 m)] <Insert dimension> and a continuous metal receiver with integral drip-edge cleat to engage fascia cover [and secure single-ply roof membrane]. Provide matching corner units.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain "Metallic-Coated Steel Sheet Fascia Covers" or "Formed Aluminum Sheet Fascia Covers" Subparagraph below. Retain thickness of fascia cover that meets performance requirements and has the rigidity to suit Project.

2. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal [0.028-inch (0.71-mm) thickness] [0.034-inch (0.86-mm) thickness] [thickness as required to meet performance requirements] <Insert thickness>.
  - a. Surface: [Smooth, flat] [Embossed] finish.
  - b. Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Two-coat mica fluoropolymer] [Three-coat metallic fluoropolymer] <Insert finish>.
  - c. Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color>.
3. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, [0.040 inch (1.02 mm) thick] [0.050 inch (1.27 mm) thick] [0.063 inch (1.60 mm) thick] [thickness as required to meet performance requirements] <Insert thickness>.
  - a. Surface: [Smooth, flat] [Embossed] finish.
  - b. Finish: [Mill] [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Two-coat mica fluoropolymer] [Three-coat metallic fluoropolymer] [Clear anodic] [Color anodic] <Insert finish>.

Delete "Color" Subparagraph below for mill and clear anodic finishes. First four options are examples of color anodic finishes and may vary in color range and availability among manufacturers.

- c. Color: [Light bronze] [Medium bronze] [Dark bronze] [Black] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color>.

Some manufacturers do not offer first two options in "Corners" Subparagraph below; if required, verify availability with manufacturers.

4. Corners: Factory mitered and [soldered] [continuously welded] [mechanically clinched and sealed watertight].
5. Splice Plates: [Concealed] [Exposed], of same material, finish, and shape as fascia cover.
6. Receiver: [Galvanized-steel sheet, nominal **0.040-inch (1.02-mm)** thickness] [Aluminum sheet, **0.050 inch (1.27 mm)** thick] [Extruded aluminum, **0.080 inch (2.03 mm)** thick] [Manufacturer's standard material and thickness].

Scuppers separate from roof-edge specialties are specified in "Roof-Edge Drainage Systems" Article.

7. Fascia Accessories: [Fascia extenders with continuous hold-down cleats] [Wall cap] [Soffit trim] [Overflow scuppers] [Overflow scuppers with perforated screens] [Spillout scuppers] [Downspout scuppers with integral conductor head and downspout adapters] [Downspout scuppers with integral conductor head and downspout adapters and perforated screens] <Insert description>.

Retain "One-Piece Gravel Stops" Paragraph below for a one-piece gravel stop; revise to suit Project. Product configurations vary considerably; revise to suit Project.

- C. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding [**12 feet (3.6 m)**] <Insert dimension>, with a horizontal flange and vertical leg[, **drain-through**] fascia[ **terminating in a drip edge**], and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.
  1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain one of three metal gravel stops subparagraphs below. Retain thickness of gravel stop that meets performance requirements and has the rigidity to suit Project.

2. Metallic-Coated Steel Sheet Gravel Stops: Zinc-coated (galvanized) steel, nominal [**0.028-inch (0.71-mm)** thickness] [**0.034-inch (0.86-mm)** thickness] [thickness as required to meet performance requirements] <Insert thickness>.
  - a. Surface: [Smooth, flat] [Embossed] finish.
  - b. Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Two-coat mica fluoropolymer] [Three-coat metallic fluoropolymer] <Insert finish>.
  - c. Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color>.
3. Formed Aluminum Sheet Gravel Stops: Aluminum sheet, [**0.040 inch (1.02 mm)** thick] [**0.050 inch (1.27 mm)** thick] [**0.063 inch (1.60 mm)** thick] [thickness as required to meet performance requirements] <Insert thickness>.
  - a. Surface: [Smooth, flat] [Embossed] finish.
  - b. Finish: [Mill] [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Two-coat mica fluoropolymer] [Three-coat metallic fluoropolymer] [Clear anodic] [Color anodic] <Insert finish>.

Delete "Color" Subparagraph below for mill and clear anodic finishes. First four options are examples of color anodic finishes and may vary in color range and availability among manufacturers.

- c. Color: [Light bronze] [Medium bronze] [Dark bronze] [Black] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color>.
- 4. Formed Copper Sheet Gravel Stops: Copper sheet, [20 oz./sq. ft. (0.68 mm thick)] [weight (thickness) as required to meet performance requirements] <Insert weight (thickness)>.
  - a. Copper Finish: [Non-patinated, mill] [Pre-patinated dark brown] [Pre-patinated verdigris] <Insert finish>.

Some manufacturers do not offer first two options in "Corners" Subparagraph below; if required, verify availability with manufacturers.

- 5. Corners: Factory mitered and [soldered] [continuously welded] [mechanically clinched and sealed watertight].
- 6. Accessories: [Fascia extenders with continuous hold-down cleats] [Wall cap] [Soffit trim] <Insert description>.

## 2.4 ROOF-EDGE DRAINAGE SYSTEMS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Gutters: Manufactured in uniform section lengths not exceeding [12 feet (3.6 m)] <Insert dimension>, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
  - 1. Zinc-Coated Steel: Nominal [0.028-inch (0.71-mm)] [0.034-inch (0.86-mm)] <Insert value> thickness.
  - 2. Aluminum Sheet: [0.032 inch (0.81 mm)] [0.040 inch (1.02 mm)] [0.050 inch (1.27 mm)] [0.063 inch (1.60 mm)] <Insert value> thick.
  - 3. Copper Sheet: [16 oz./sq. ft. (0.55 mm thick)] [20 oz./sq. ft. (0.68 mm thick)] <Insert value>.

Retain "Gutter Profile" Subparagraph below if Drawings do not show cross section or profile in sufficient detail. Most manufactured gutter profiles are rectangular with variations. See SMACNA's "Architectural Sheet Metal Manual" to identify commonly used gutter profiles. See the Evaluations for discussion of highback gutters; verify availability with manufacturers. CopperCraft and perhaps other manufacturers offer the "quarter-round" option.

- 4. Gutter Profile: [Style A] [Style B] [Style F] [Style G] [Style H] [Style I] [Style K] [Style K highback] [Half-round single bead] [Half-round highback] [Quarter round] [Ogee] [As indicated] <Insert style> in accordance with SMACNA's "Architectural Sheet Metal Manual."

Some manufacturers do not offer first two options in "Corners" Subparagraph below; if required, verify availability with manufacturers.

- 5. Corners: Factory mitered and [soldered] [continuously welded] [mechanically clinched and sealed watertight].

See SMACNA's "Architectural Sheet Metal Manual" for discussion of gutter brackets, straps, and spikes and ferrules for supporting gutters; see manufacturers' written instructions.

6. Gutter Supports: [Gutter brackets] [Straps] [Spikes and ferrules] [Manufacturer's standard supports as selected by Architect] <Insert description> with finish matching the gutters.
  7. Gutter Accessories: [Continuous screened leaf guard with sheet metal frame] [Continuous hinged leaf guard of solid metal designed to shed leaves] [Continuous snap-in plastic leaf guard] [Bronze wire ball downspout strainer] [Wire ball downspout strainer] [Flat ends] [Bullnose ends for half-round gutter] <Insert description>.
- C. Downspouts: [Plain round] [Corrugated round] [Plain rectangular] [Corrugated rectangular] [Open-face rectangular] <Insert shape> complete with [machine-crimped] [mitered] [smooth-curve] elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Zinc-Coated Steel: Nominal [0.028-inch (0.71-mm)] [0.034-inch (0.86-mm)] <Insert value> thickness.
  2. Formed Aluminum: [0.032 inch (0.81 mm)] [0.040 inch (1.02 mm)] [0.050 inch (1.27 mm)] [0.063 inch (1.60 mm)] <Insert value> thick.
  3. Copper: [16 oz./sq. ft. (0.55 mm thick)] <Insert value>.

Manufacturers offer a variety of scupper configurations. Parapet scuppers, which are installed in parapet wall, discharge into conductor heads or, as overflow scuppers, merely project through the parapet. Scuppers combined with roof-edge specialties and discharging into gutters or conductor heads are specified in "Roof-Edge Specialties" Article.

- D. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof.[ Fasten gravel guard angles to base of scuppers.]
1. Zinc-Coated Steel: Nominal [0.028-inch (0.71-mm)] <Insert value> thickness.
  2. Formed Aluminum: [0.032 inch (0.81 mm)] <Insert value> thick.
  3. Stainless Steel: [0.0188 inch (0.477 mm)] <Insert value> thick.
  4. Copper: [16 oz./sq. ft. (0.55 mm thick)] <Insert weight (thickness)>.

Manufacturers offer a variety of conductor-head designs. If a highly ornamental conductor head is required, show details on Drawings or insert manufacturer's name and model number as a basis of design.

- E. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout[, exterior flange trim,] [and] [built-in overflow].
1. Zinc-Coated Steel: Nominal [0.028-inch (0.71-mm)] <Insert value> thickness.
  2. Formed Aluminum: [0.032 inch (0.81 mm)] <Insert value> thick.
  3. Stainless Steel: [0.0156 inch (0.396 mm)] <Insert value> thick.
  4. Copper: [16 oz./sq. ft. (0.55 mm thick)] <Insert weight (thickness)>.

Retain required finish selection from options in paragraphs below. If retaining more than one finish and color, indicate locations of each on Drawings or by inserting descriptive text.



- F. Zinc-Coated Steel Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Two-coat mica fluoropolymer] [Three-coat metallic fluoropolymer] <Insert finish>.
  - 1. Color: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color>.
- G. Aluminum Finish: [Mill] [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Two-coat mica fluoropolymer] [Three-coat metallic fluoropolymer] [Clear anodic] [Color anodic] <Insert finish>.

Delete "Color" Subparagraph below for mill and clear anodic finishes. First four options are examples of color anodic finishes and may vary in color range and availability among manufacturers.

- 1. Color: [Light bronze] [Medium bronze] [Dark bronze] [Black] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color>.
- H. Copper Finish: [Non-patinated, mill] [Pre-patinated dark brown] [Pre-patinated verdigris] <Insert finish>.

## 2.5 REGLETS AND COUNTERFLASHINGS

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
  - 1. Zinc-Coated Steel: Nominal [0.022-inch (0.56-mm)] [0.028-inch (0.71-mm)] <Insert value> thickness.
  - 2. Formed Aluminum: [0.024 inch (0.61 mm)] [0.050 inch (1.27 mm)] <Insert value> thick.
  - 3. Stainless Steel: [0.0188 inch (0.477 mm)] [0.0250 inch (0.635 mm)] <Insert value> thick.
  - 4. Copper: [16 oz./sq. ft. (0.55 mm thick)] <Insert weight (thickness)>.

Some manufacturers do not offer first two options in "Corners" Subparagraph below; if required, verify availability with manufacturers.

- 5. Corners: Factory mitered and [soldered] [continuously welded] [mechanically clinched and sealed watertight].

Retain one of or more reglet types in five subparagraphs below.

- 6. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  - 7. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
  - 8. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

9. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
10. Multiuse Type, Embedded: For multiuse embedment in **[cast-in-place concrete]** **[masonry mortar joints]**.

Coordinate "Counterflashings" Paragraph below with sheet metal through-wall flashing (with snaplock receiver to receive counterflashing), specified in either Section 042000 "Unit Masonry" or Section 076200 "Sheet Metal Flashing and Trim." Revise paragraph if one-piece counterflashings are required; see Evaluations.

- C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by **4 inches (100 mm)** and in lengths not exceeding **[12 feet (3.6 m)]** **<Insert dimension>** designed to snap into **[reglets]** **[or]** **[through-wall-flashing receiver]** and compress against base flashings with joints lapped, from the following exposed metal:
1. Zinc-Coated Steel: Nominal **[0.022-inch (0.56-mm)]** **[0.028-inch (0.71-mm)]** **<Insert value>** thickness.
  2. Formed Aluminum: **[0.024 inch (0.61 mm)]** **[0.032 inch (0.81 mm)]** **<Insert value>** thick.
  3. Stainless Steel: **[0.0188 inch (0.477 mm)]** **[0.0250 inch (0.635 mm)]** **<Insert value>** thick.
  4. Copper: **[16 oz./sq. ft. (0.55 mm thick)]** **<Insert weight (thickness)>**.
- D. Accessories:
1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
  2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

Retain required finish selection from options in paragraphs below. If retaining more than one finish and color, indicate locations of each on Drawings or by inserting descriptive text.

- E. Zinc-Coated Steel Finish: **[Two-coat fluoropolymer]** **[Three-coat fluoropolymer]** **[Two-coat mica fluoropolymer]** **[Three-coat metallic fluoropolymer]** **<Insert finish>**.
1. Color: **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color>**.
- F. Aluminum Finish: **[Mill]** **[Two-coat fluoropolymer]** **[Three-coat fluoropolymer]** **[Two-coat mica fluoropolymer]** **[Three-coat metallic fluoropolymer]** **[Clear anodic]** **[Color anodic]** **<Insert finish>**.

Delete "Color" Subparagraph below for mill and clear anodic finishes. First four options are examples of color anodic finishes and may vary in color range and availability among manufacturers.

1. Color: **[Light bronze]** **[Medium bronze]** **[Dark bronze]** **[Black]** **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color>**.



Stainless steel finishes are often not indicated in manufacturers' catalogs; verify availability with manufacturers before retaining a numbered finish.

- G. Stainless Steel Finish: [ASTM A480/A480M No. 2B (bright, cold rolled, unpolished)] [ASTM A480/A480M No. 3 (coarse, polished directional satin)] [ASTM A480/A480M No. 4 (bright, polished directional satin)] <Insert finish>.
- H. Copper Finish: [Non-patinated, mill] [Pre-patinated verdigris] <Insert finish>.

## 2.6 MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation.
- B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

Type 304 stainless steel is standard in manufacturers' literature. Revise "Stainless Steel Sheet" Paragraph below if Type 316 stainless steel is required; verify availability with manufacturers.

- C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- D. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper.

## 2.7 UNDERLAYMENT MATERIALS

Retain applicable paragraphs in this article for roof specialties applied directly over dissimilar metal or corrosive substrates. These underlayments are also used to resist leaks and to provide continuity of building water, air, and vapor barriers.

Self-adhering underlayment in "Self-Adhering, High-Temperature Sheet" Paragraph below is manufactured for high temperatures associated with exposed metals used in roofing applications. Revise if high-temperature underlayment is not required.

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) 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.
  - 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
  - 2. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F (116 deg C).
  - 3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C).

Type II (No. 30) felt or self-adhering sheet underlayment is generally used over wood blocking or sheathing when air- and moisture-tight construction is not required; verify need with roof-specialty manufacturer.

- B. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

Slip sheet in "Slip Sheet" Paragraph below is often used over other types of underlayment materials and may be required over a felt underlayment; verify need with roof-specialty manufacturer.

- C. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum.

## 2.8 MISCELLANEOUS MATERIALS

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

Retain applicable subparagraphs below and revise to suit Project.

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
3. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel in accordance with ASTM A153/A153M or ASTM F2329.

Revise "Elastomeric Sealant" Paragraph below if sealant of specific type, grade, class, and use is required.

- B. Elastomeric Sealant: ASTM C920, elastomeric [polyurethane] [silicone] polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

Retain "Butyl Sealant" Paragraph below for concealed sealant use in metal joints with limited movement.

- C. Butyl Sealant: ASTM C1311, 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 D1187/D1187M.
- E. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

Retain "Solder for Copper" Paragraph below if required for copper components; verify availability with manufacturers. If required, retain tin-lead solder option where permitted by authorities having jurisdiction, or insert another specific solder grade (alloy). Insert solders for other metals to suit Project. See "Seaming and Fastening" Article in the Evaluations.

- F. Solder for Copper: ASTM B32, [lead-free solder] [Grade Sn50, 50 percent tin and 50 percent lead] <Insert solder grade>.

## 2.9 FINISHES

Retain one of or more finish descriptions from four finishes paragraphs below corresponding to finish selections indicated under product descriptions above or on Drawings.

- A. Coil-Coated Galvanized-Steel Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.
  - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.
  - b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.
  - c. Two-Coat Mica Fluoropolymer: AAMA 621. Fluoropolymer finish with suspended mica flakes containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.
  - d. Three-Coat Metallic Fluoropolymer: AAMA 621. Fluoropolymer finish with suspended metallic flakes containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.

**B. Coil-Coated Aluminum Sheet Finishes:**

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Retain one of or more of four fluoropolymer subparagraphs below if a painted finish is required.

- a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.
  - b. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.
  - c. Two-Coat Mica Fluoropolymer: AAMA 2605. Fluoropolymer finish with suspended mica flakes containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.
  - d. Three-Coat Metallic Fluoropolymer: AAMA 2605. Fluoropolymer finish with suspended metallic flakes containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.
2. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] [AA-M12C22A31, Class II, 0.010 mm] or thicker.
3. Color Anodic Finish: AAMA 611, [AA-M12C22A42/A44, Class I, 0.018 mm] [AA-M12C22A32/A34, Class II, 0.010 mm] or thicker.

**C. Copper Sheet Finishes:**

1. Non-Patinated Finish: Mill finish.
2. Pre-Patinated Finish: Chemically treated in accordance with ASTM B882.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF UNDERLAYMENT

Retain "Self-Adhering Sheet Underlayment" or "Felt Underlayment" Paragraph below as required.

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than **6 inches (152 mm)** staggered **24 inches (610 mm)** between courses. Overlap side edges not less than **3-1/2 inches (90 mm)**. Roll laps with roller. Cover underlayment within 14 days.

Retain one of or both subparagraphs below.

1. Apply continuously under **[copings]** **[roof-edge specialties]** **[and]** **[reglets and counterflashings]**.
  2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.
- B. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than **2 inches (50 mm)**.
- C. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than **2 inches (50 mm)**.

### 3.2 INSTALLATION, GENERAL

- A. Install roof specialties in accordance with 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]** **[and]** **[stainless steel]** 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.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
1. Space movement joints at a maximum of [**12 feet (3.6 m)**] <Insert dimension> with no joints within [**18 inches (450 mm)**] <Insert dimension> of corners or intersections unless otherwise indicated on Drawings.
  2. When ambient temperature at time of installation is between **40 and 70 deg F (4 and 21 deg C)**, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that penetrate [**wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws**] [**substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance**] <Insert size requirement>.
- 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 (4 deg C)**.

Retain "Soldered Joints" Paragraph below if required for copper components; verify with manufacturers.

- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of **1-1/2 inches (38 mm)**; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

### 3.3 INSTALLATION OF COPINGS

- 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.

Retain first subparagraph below for snap-on-type copings mounted on cleated anchor plates.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at [**30-inch (762-mm) centers**] [**40-inch (1016-mm) centers**] [**manufacturer's required spacing that meets performance requirements**] <Insert spacing>.

Retain subparagraph below for copings with back leg fasteners exposed.

2. Interlock face-leg drip edge into continuous cleat anchored to substrate at [**24-inch (610-mm) centers**] [**16-inch (406-mm) centers**] [**manufacturer's required spacing that meets performance requirements**] <Insert spacing>. Anchor back leg of coping with

screw fasteners and elastomeric washers at **[24-inch (610-mm) centers]** **[16-inch (406-mm) centers]** **[manufacturer's required spacing that meets performance requirements]** **<Insert spacing>**.

### 3.4 INSTALLATION OF ROOF-EDGE SPECIALITIES

Coordinate installation of roof-edge specialties with applicable low-slope roofing Section.

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

### 3.5 INSTALLATION OF ROOF-EDGE DRAINAGE SYSTEMS

- A. Install components to produce a complete roof-edge drainage system in accordance with manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

Retain last option in "Gutters" Paragraph below if soldering the joints and ends of copper gutters.

- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than **[12 inches (305 mm)]** **[24 inches (610 mm)]** **[30 inches (762 mm)]** **<Insert dimension>** apart. Attach ends with rivets and **[seal with sealant]** **[solder]** to make watertight. Slope to downspouts.
  - 1. Install gutter with expansion joints at locations indicated but not exceeding **[50 feet (15.2 m)]** **<Insert dimension>** apart. Install expansion-joint caps.
  - 2. Install continuous leaf guards on gutters with noncorrosive fasteners, **[removable]** **[hinged to swing open]** for cleaning gutters.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and **1 inch (25 mm)** away from walls; locate fasteners at top and bottom and at approximately **[60 inches (1500 mm)]** **<Insert dimension>** o.c.

Retain one of two subparagraphs below.

- 1. Provide elbows at base of downspouts at grade to direct water away from building.
  - 2. Connect downspouts to underground drainage system indicated.
- D. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
- E. Conductor Heads: Anchor securely to wall with elevation of conductor top edge **1 inch (25 mm)** below **[scupper]** **[gutter]** discharge.

3.6 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

- A. Embedded Reglets: See [Section 033000 "Cast-in-Place Concrete"] [and] [Section 042000 "Unit Masonry"] for installation of reglets.
- B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.
- C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.7 CLEANING AND PROTECTION

Retain paragraphs below that apply to roof specialties specified for Project. First paragraph below is not applicable to stainless steel or to painted or coated steel and aluminum.

- 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.

END OF SECTION 077100

## SECTION 077200 - ROOF ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Roof hatches.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.
- B. Shop Drawings: For roof accessories.
- C. Samples: For each exposed product and for each color and texture specified.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Cover and Curb: Thermally broken to prevent heat transfer between interior and exterior surfaces.
- B. Loading: Reinforced to support a minimum live load of 40 psf with a maximum deflection of 1/150th of the span or 20 psf wind uplift.
- C. Operation: Smooth with controlled operation throughout the entire arc of opening and closing. Operation of the cover shall not be affected by temperature.
- D. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.



## 2.2 ROOF HATCH

- A. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.
  - 1. Basis-of Design Product: Subject to compliance with requirements, provide Bilco Company (The); F-50TB Roof Hatch, a comparable product by the following, or a substitution approved by Architect:
    - a. Dur-Red Products.
- B. Type; Single-leaf hinged lid
- C. Size: 48 x 48 inches
- D. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.
- E. Hatch Material: Zinc-coated (galvanized) or Aluminum-zinc alloy-coated steel sheet.
  - 1. Thickness: Manufacturer's standard thickness for hatch size indicated.
  - 2. Finish: Two-coat fluoropolymer or baked enamel or powder coat.
  - 3. Color: As selected by Architect from manufacturer's full range.
- F. Construction:
  - 1. Insulation: Polyisocyanurate board.
    - a. R-Value: 20.3 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. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
- G. Hardware: Spring operators, hold-open arm, galvanized-steel spring latch with turn handles, galvanized-steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

## 2.3 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. Glass-Fiber Board Insulation: ASTM C 726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.

- C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, and complying with AWPAC2; not less than 1-1/2 inches thick.
- D. 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.
- E. Elastomeric Sealant: ASTM C 920, elastomeric 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.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- G. Asphalt Roofing Cement: ASTM D 4586/D 4586M, asbestos free, of consistency required for application.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Verify dimensions of roof openings for roof accessories. 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. 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. Seal joints with elastomeric sealant as required by roof accessory manufacturer.

### 3.2 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. 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 078413 - PENETRATION FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Penetrations in fire-resistance-rated walls.
  - 2. Penetrations in horizontal assemblies.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

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

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.

#### 1.4 CLOSEOUT SUBMITTALS

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

#### 1.5 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."

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

#### A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
  - a. Penetration 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."
    - 3) FM Global in its "Building Materials Approval Guide."

### 2.2 PENETRATION FIRESTOPPING SYSTEMS

#### A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. 3M Fire Protection Products.
  - b. A/D Fire Protection Systems Inc.
  - c. Hilti, Inc.
  - d. NUCO Inc.
  - e. RectorSeal.
  - f. Specified Technologies, Inc.
  - g. Tremco, Inc.

#### B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

#### C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.

- 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Exposed Penetration Firestopping Systems (If required): Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- 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 system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

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

### 3.2 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078413

## SECTION 078443 - JOINT FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.

B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. 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.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

#### 1.4 CLOSEOUT SUBMITTALS

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

#### 1.5 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 UL's "Qualified Firestop Contractor Program Requirements."



## 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.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. 3M Fire Protection Products.
    - b. A/D Fire Protection Systems Inc.
    - c. Hilti, Inc.
    - d. NUCO Inc.
    - e. RectorSeal.
    - f. Specified Technologies, Inc.
    - g. Tremco, Inc.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
1. 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. Exposed Joint Firestopping Systems (if required): Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- D. 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 INSTALLATION

- 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. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- C. 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.
- D. 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.

### 3.2 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.

END OF SECTION 078443

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## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Mildew-resistant joint sealants.
4. Latex joint sealants.

- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field-adhesion-test reports.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products listed in other Part 2 articles by one of the following manufacturers or a substitution approved prior to the date for receipt of Bids. Shortened versions (shown in parentheses) of the manufacturers' names are used in Part 2:

1. (BASF) BASF Building Systems
2. (DOW) Dow Corning Corporation
3. (GE) GE Construction Sealants; Momentive Performance Materials, Inc.
4. (HEN) Henkel Corporation
5. (PEC) Pecora Corporation
6. (SIK) Sika Corporation, Construction Products Division
7. (TRM) Tremco Incorporated
8. (USG) USG Corporation

## 2.2 JOINT SEALANTS, GENERAL

- A. 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.
- B. Colors of Exposed Joint Sealants: As indicated on Drawings or if not indicated match adjacent surface. Where adjacent surfaces are different colors, verify color with Architect.

## 2.3 SILICONE JOINT SEALANTS

- A. **S-1:** ASTM C 920, Neutral-Curing Type S, Grade NS, Class 50, for Use NT
  - 1. DOW 791.
  - 2. GE SilPruf SCS2000.
  - 3. PEC 864 NST.
  - 4. SIK Sikasil WS 295.
  - 5. TRM Spectrem 3.
- B. **S-2:** ASTM C 920, Neutral-Curing, Type S, Grade NS, Class 100/50, for Use NT.
  - 1. DOW 790.
  - 2. GE SilPruf LM SCS2700.
  - 3. PEC 890.
  - 4. SIK Sikasil-WS 290.
  - 5. TRM Spectrem 1.
- C. **S-3:** ASTM C 920, Mildew-Resistant, Acid or Neutral-Curing, Type S, Grade NS, Class 25, for Use NT.
  - 1. DOW 786 Mildew Resistant.
  - 2. GE Sanitary SCS1700.
  - 3. PEC 898
  - 4. TRM Tremsil 200

## 2.4 URETHANE JOINT SEALANTS

- A. **S-4:** ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT
  - 1. SIK Sikasil 728 NS
  - 2. PEC 890 NST
  - 3. TRM Dymonic 100

## 2.5 LATEX JOINT SEALANTS

- A. **S-10:** Latex Sealant Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. BASF Sonolac.
2. PEC AC-20+.
3. TRM Tremflex 834.

## 2.6 ACOUSTICAL JOINT SEALANTS

- A. **S-11:** Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. HEN Henkel Corp.; OSI SC-170
2. PEC AIS-919 or AC-20 FTR.
3. USG SHEETROCK Acoustical Sealant.
4. TRM Acoustical Sealant

## 2.7 JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

## 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.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

# PART 3 - EXECUTION

## 3.1 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 laitance and form-release agents from concrete.

2. 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.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

### 3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. 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.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. 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.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

### 3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
  1. Extent of Testing: Test completed and cured sealant joints as follows:
    - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
    - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.4 JOINT-SEALANT SCHEDULE

#### A. Exterior Joints

- |                                                                            |     |
|----------------------------------------------------------------------------|-----|
| 1. Vertical surfaces and horizontal nontraffic surfaces                    | S-1 |
| 2. Vertical surfaces and horizontal nontraffic surfaces with high movement | S-2 |
| 3. Horizontal traffic surfaces                                             | S-4 |

#### B. Interior Joints

- |                                                                              |      |
|------------------------------------------------------------------------------|------|
| 1. Vertical surfaces and horizontal nontraffic surfaces                      | S-1  |
| 2. Mildew-resistant on vertical surfaces and horizontal nontraffic surfaces  | S-3  |
| 3. Horizontal traffic surfaces                                               | S-4  |
| 4. Vertical and horizontal nontraffic, nonmoving joints                      | S-10 |
| 5. Acoustical joints in vertical surfaces and horizontal nontraffic surfaces | S-11 |

END OF SECTION 079200



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## SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Interior standard steel doors and frames.
  - 2. Exterior standard steel doors and frames.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door type.
  - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
- C. 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.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: 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.
- B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.21 deg Btu/F x h x sq. ft. when tested according to ASTM C 518.

## 2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide hollow metal products by one of the following:
  1. Ceco Door; ASSA ABLOY.
  2. Curries Company; ASSA ABLOY.
  3. Daybar Industries, Ltd.
  4. Fleming Door Products Ltd.; Assa Abloy Group Company.
  5. Republic Doors and Frames.
  6. Steelcraft; an Allegion brand.

## 2.3 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. Heavy-Duty Doors and Frames: SDI A250.8, Level 2; SDI A250.4, Level B..
  1. Doors:
    - a. Type: As indicated in the Door and Frame Schedule.
    - b. Thickness: 1-3/4 inches.
    - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (18 gage) with minimum A40coating.
    - d. Edge Construction: Model 1, Full Flush.
    - 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 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:
      - 1) Insulated: Polyurethane.
  2. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (16 gage).with minimum A40coating.
    - b. Construction: Full profile welded.

## 2.4 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. Standard-Duty Doors and Frames (All Doors Unless Noted Otherwise): SDI A250.8, Level 1; SDI A250.4, Level C..

- 1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches.
- c. Face: Uncoated steel sheet, minimum thickness of 0.032 inch (20 gage).
- d. Edge Construction: Model 1, Full Flush.
- e. Core:

- 1) Uninsulated: Manufacturer's standard.
- 2) Insulated: Polyurethane.

- 2. Frames:

- a. Materials: Uncoated steel sheet, minimum thickness of 0.042 inch (18 gage).
- b. Construction: Knocked down.

- C. Heavy-Duty Doors and Frames (Fire-Rated Doors): SDI A250.8, Level 2; SDI A250.4, Level B..

- 1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches.
- c. Face: Uncoated steel sheet, minimum thickness of 0.042 inch. (18 gage).
- d. Edge Construction: Model 1, Full Flush.
- e. Fire-Rated Core: Manufacturer's standard vertical steel stiffener or laminated mineral board core.

- 2. Frames:

- a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (16 gage).
- b. Construction: Full profile welded.

## 2.5 ADJUSTABLE STEEL FRAMES

- A. Application: Fire rated door openings with wood casings.
- B. Basis-of-Design Product: Subject to compliance with requirements provide Therma-Tru Corp.; Split Steel Frame or a comparable product from one of the following:
  - 1. Dunbarton Corporation: Rediframe Kerf Rediflex Adjustable Throat Steel Door Frame.
  - 2. Metropolitan Door Industries Corporation, Adjustable KD Frame.

## 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.
- 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 GLAZING

- A. Glazing Stops and Gaskets: Manufacturer's standard stops and preformed gaskets.
- B. Glazing: As specified in Section 088000 "Glazing."

## 2.8 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."

## 2.9 FABRICATION

- A. 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. 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.
- B. 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.
- C. 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. 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.
  - 3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
  - 4. 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.

## 2.10 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. 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.
    - c. Solidly fill frames with grout where indicated.
  - 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. 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.
- B. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
  - 1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  - 3. Smoke-Control Doors: Install doors according to NFPA 105.

- C. 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.

END OF SECTION 081113



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SECTION 081416 - FLUSH WOOD DOORS **(NOT YET EDITED ... for Office TI)**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Five-ply flush wood veneer-faced doors for transparent finish.
2. Five-ply flush wood doors for opaque finish.
3. Solid-core flush wood doors with plastic-laminate-faces.
4. Hollow-core flush wood veneer-faced doors for transparent finish.
5. Hollow-core flush wood doors for opaque finish.
6. Hollow-core flush wood doors with plastic-laminate faces.
7. Fire-rated wood door frames.

Retain one or both subparagraphs below if applicable. See the Evaluations.

8. Factory **[priming]** **[finishing]** flush wood doors[ **and frames**].
9. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door louvers.
5. Door trim for openings.
6. Door frame construction.
7. Factory-machining criteria.
8. Factory-**[priming]** **[finishing]** specifications.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for EPDs and HPDs.>
2. <Double click to insert sustainable design text for regional materials.>
3. <Double click to insert sustainable design text for certified wood.>
4. <Double click to insert sustainable design text for certified wood.>
5. <Double click to insert sustainable design text for adhesives.>
6. <Double click to insert sustainable design text for composite wood.>

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door[ **and frame**] location, type, size, fire protection rating, and swing.

2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Clearances and undercuts.
7. Requirements for veneer matching.

Retain subparagraph below and applicable option if retaining other requirements for AWI's or WI's quality certification programs.

8. Apply [**AWI Quality Certification**] [**WI Certified Compliance**] Program label to Shop Drawings.
- D. Samples: For [**plastic-laminate door faces**] [**polymer edging**] [**factory-finished doors**] [**and**] [**factory-finished door frames**].

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.

Retain one of or both "Fire-Rated Door Inspector" and "Egress Door Inspector" subparagraphs below, or delete first two subparagraphs and retain third subparagraph. First paragraph applies to the IBC and NFPA 101. Second subparagraph applies to NFPA 101. Certification in third subparagraph below should be acceptable by all authorities having jurisdiction. See the Evaluations.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
  2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
  3. Submit copy of DHI's Fire and Egress Door Assembly Inspector (FDAI) certificate.
- B. Field quality-control reports.

### 1.4 CLOSEOUT SUBMITTALS

Retain "Quality Standard Compliance Certificates" Paragraph below if AWI Quality Certification Program or WI Certified Compliance Program is required.

- A. Quality Standard Compliance Certificates: [**AWI Quality Certification**] [**WI Certified Compliance**] Program certificates.
- B. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

### 1.5 QUALITY ASSURANCE

- A. <Double click to insert sustainable design text for manufacturer qualifications.>

- B. <Double click to insert sustainable design text for vendor qualifications.>

Retain one of two options in "Manufacturer's Certification" Paragraph below if AWI Quality Certification Program or WI Certified Compliance Program is required. Both AWI and WI will inspect work and provide certification for work that passes inspection if manufacturer is not licensed under their respective programs.

- C. Manufacturer's Certification: Licensed participant in [**AWI's Quality Certification Program**] [**WI's Certified Compliance Program**].
- D. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies complies with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:

Retain subparagraph below if requiring fire door inspectors to be certified under DHI's certification program. Verify, with authorities having jurisdiction, if other DHI certifications are acceptable, such as Architectural Hardware Consultant (AHC), Certified Door Consultant (CDC), and Architectural Openings Consultant (AOC).

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

- E. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies complies with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

Retain subparagraph below if requiring egress door inspectors to be certified under DHI's certification program. Verify, with authorities having jurisdiction, if other DHI certifications are acceptable, such as AHC, CDC and AOC.

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

## PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

### 2.1 PERFORMANCE REQUIREMENTS

Retain "Fire-Rated Wood Doors( and Frame) Assemblies" Paragraph below if applicable.

- A. Fire-Rated Wood Door[ **and Frame**] Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction,

for fire-protection ratings [**and temperature-rise limits**] indicated on Drawings, based on testing at positive pressure in accordance with [UL 10C] [or] [NFPA 252].

Retain "Oversize Fire-Rated Door Assemblies" Subparagraph below if required by authorities having jurisdiction.

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.

Retain "Temperature-Rise Limit" Subparagraph below if required. The IBC allows an exception for buildings equipped throughout with fire-suppression sprinklers.

2. Temperature-Rise Limit: [**Where indicated on Drawings**] [**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.

Retain "Smoke- and Draft-Control Door Assemblies" Paragraph below if required. The IBC requires fire door assemblies to comply with smoke- and draft-control requirements in corridors, smoke barriers, and smoke partitions.

- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

## 2.2 FLUSH WOOD DOORS AND FRAMES, GENERAL

Retain one standard in "Quality Standard" Paragraph below. Review retained standard and coordinate its requirements with retained options. See the Evaluations.

- A. Quality Standard: In addition to requirements specified, comply with [**"Architectural Woodwork Standards."**] [ANSI/WDMA I.S. 1A.]

Certification programs in first subparagraph below are available to member and nonmember firms of AWI and WI. Both organizations will inspect doors and provide certification for doors that pass inspection if door manufacturer is not licensed.

1. Provide [labels] [and] [certificates] from [AWI] [WI] certification program indicating that doors[ **and frames**] comply with requirements of grades specified.

Retain one of two subparagraphs below if Project is to be certified under AWI Quality Certification Program.

- a. This project has been registered with AWI as AWI Quality Certification Program Number <**Insert number**>.
- b. Contractor registers the Work under this Section with the AWI Quality Certification Program at [www.awiqcp.org](http://www.awiqcp.org) or by calling 855-345-0991.

- B. <Double click to insert sustainable design text for regional materials.>

- C. [<Double click to insert sustainable design text for certified wood.>](#)
- D. [<Double click to insert sustainable design text for adhesives.>](#)
- E. [<Double click to insert sustainable design text for composite wood products.>](#)

## 2.3 SOLID-CORE, FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

Retain this article for traditional five-ply flush wood doors.

Insert drawing designation, if applicable, for each product required. Use these designations on Drawings to identify each product.

- A. Exterior Doors, Solid-Core Five-Ply Veneer-Faced **<Insert drawing designation>**:
  - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

WDMA indicates that its standard is not intended for exterior doors. If exterior flush wood doors are required and ANSI/WDMA I.S. 1A is referenced, usually retain first option in "Performance Grade" Subparagraph below.

- 2. Performance Grade: ANSI/WDMA I.S. 1A [**Extra Heavy Duty**] [**Heavy Duty**] [**as indicated on Drawings**].
- 3. [**Architectural Woodwork Standards**] [ANSI/WDMA I.S. 1A] Grade: [**Premium**] [**Custom**].
- 4. Faces: Single-ply wood veneer not less than **1/50 inch (0.508 mm)** thick.

Options in "Species" Subparagraph below are examples only; revise or insert another species.

- a. Species: [**Anigre**] [**Select white ash**] [**Figured select white ash**] [**Select white birch**] [**Select red birch**] [**Cherry**] [**Select red gum**] [**Figured select red gum**] [**Select white maple**] [**Red oak**] [**White oak**] [**Persimmon**] [**Sapele**] [**Sycamore**] [**Walnut**] **<Insert species>**.

First option in "Cut" Subparagraph below applies only to oak.

- b. Cut: [**Rotary cut**] [**Plain sliced (flat sliced)**] [**Quarter sliced**] [**Rift cut**].
- c. Match between Veneer Leaves: [**Book**] [**Slip**] [**Random**] match.

In "Assembly of Veneer Leaves on Door Faces" Subparagraph below, first option is standard for Premium-grade doors. Third option is standard for Custom-grade doors.

- d. Assembly of Veneer Leaves on Door Faces: [**Center-balance**] [**Balance**] [**Running**] match.
- e. Pair and Set Match: Provide for doors hung in same opening[ **or separated only by mullions**].

Retain first option in "Exposed Vertical( and Top) Edges" Subparagraph below if top edges of doors are visible, such as doors in multistory spaces. Retain one of four remaining options; last two require factory prefitting.

5. Exposed Vertical[ **and Top**] Edges: [Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A] [Same species as faces - Architectural Woodwork Standards edge Type A] [Applied wood-veneer edges of same species as faces and covering edges of faces - Architectural Woodwork Standards edge Type B] [Applied wood edges of same species as faces and covering edges of crossbands - Architectural Woodwork Standards edge Type D].
6. Core:

Retain one of first four subparagraphs below. Particleboard cores are not generally recommended for exterior doors.

- a. ANSI A208.1, [Grade LD-1] [Grade LD-2] particleboard.
- b. Glued wood stave.
- c. WDMA I.S. 10 structural composite lumber.

In each of first two subparagraphs below, first option is for Extra Heavy Duty performance grade, second option is for Heavy Duty performance grade.

- 1) Screw Withdrawal, Door Face: **[550 lbf (2440 N)]** **[475 lb (2110 N)]**.
- 2) Screw Withdrawal, Vertical Edge: **[550 lbf (2440 N)]** **[475 lb (2110 N)]**.
- d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
7. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.
8. Adhesives: Type I in accordance with WDMA T.M. 6.

Insert drawing designation, if applicable, for each product required. Use these designations on Drawings to identify each product.

B. Interior Doors, Solid-Core Five-Ply Veneer-Faced <Insert drawing designation>:

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

Retain "Performance Grade" or "Performance Grade by Location" Subparagraph below to specify performance grade if referencing ANSI/WDMA I.S. 1A.

2. Performance Grade: ANSI/WDMA I.S. 1A [Extra Heavy Duty] [Heavy Duty] [Standard Duty] [as indicated on Drawings].
3. Performance Grade by Location:
  - a. ANSI/WDMA I.S. 1A Extra Heavy Duty: [Classrooms] [public toilets] [janitor's closets] [assembly spaces] [exits] [and] [patient rooms] <Insert locations> [and where indicated on Drawings].
  - b. ANSI/WDMA I.S. 1A Standard Duty: [Closets (not including janitor's closets)] [and] [private toilets] <Insert locations> [and where indicated on Drawings].
4. [Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom].
5. Faces: Single-ply wood veneer not less than **1/50 inch (0.508 mm)** thick.

Options in "Species" Subparagraph below are examples only; revise or insert another species.

- a. Species: [Anigre] [Select white ash] [Figured select white ash] [Select white birch] [Select red birch] [Cherry] [Select red gum] [Figured select red gum] [Select white maple] [Red oak] [White oak] [Persimmon] [Sapele] [Sycamore] [Walnut] <Insert species>.

First option in "Cut" Subparagraph below applies only to oak.

- b. Cut: [Rotary cut] [Plain sliced (flat sliced)] [Quarter sliced] [Rift cut].
- c. Match between Veneer Leaves: [Book] [Slip] [Random] match.

In "Assembly of Veneer Leaves on Door Faces" Subparagraph below, first option is standard for Premium-grade doors. Third option is standard for Custom-grade doors.

- d. Assembly of Veneer Leaves on Door Faces: [Center-balance] [Balance] [Running] match.
- e. Pair and Set Match: Provide for doors hung in same opening[ or separated only by mullions].
- f. Room Match:

Retain one of first two subparagraphs below only for highest-quality work with Premium-grade doors.

- 1) 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 (3 m)] [20 feet (6 m)] <Insert dimension> or more.

First subparagraph below is based on requirement for WI Premium-grade doors.

- 2) Provide door faces of compatible color and grain within each separate room or area of building.
- g. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in Section 064216 "Flush Wood Paneling."

Retain first option in "Exposed Vertical( and Top) Edges" Subparagraph below if top edges of doors are visible, such as doors in multistory spaces. Retain one of four remaining options; last two require factory prefitting.

- 6. Exposed Vertical[ and Top] Edges: [Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A] [Same species as faces - Architectural Woodwork Standards edge Type A] [Applied wood-veneer edges of same species as faces and covering edges of faces - Architectural Woodwork Standards edge Type B] [Applied wood edges of same species as faces and covering edges of crossbands - Architectural Woodwork Standards edge Type D].
  - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
  - b. Fire-Rated Pairs of Doors:

Retain one of first two subparagraphs below. Retain first subparagraph if steel edges and astragals are unacceptable. Coordinate availability and ratings with manufacturers. Retain second subparagraph if steel edges and astragals are acceptable.



- 1) 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.
- 2) Provide formed-steel edges and astragals with intumescent seals.
  - a) Finish steel edges and astragals with baked enamel[ **same color as doors**].

Retain last subparagraph above or first subparagraph below; delete option above if edges and astragals are field painted.

- b) Finish steel edges and astragals to match door hardware (locksets or exit devices).
- c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

Requirements in "Screw-Holding Capability" Subparagraph below are from ANSI/WDMA I.S. 1A. Options are performance duty levels for Extra Heavy Duty, Heavy Duty, and Standard Duty, respectively. Before retaining, verify that products comply with requirement selected.

- 1) Screw-Holding Capability: [**550 lbf (2440 N)**] [**475 lbf (2110 N)**] [**400 lbf (1780 N)**] in accordance with WDMA T.M. 10.

#### 7. Core for Non-Fire-Rated Doors:

Retain one or more of first four subparagraphs below.

- a. ANSI A208.1, [**Grade LD-1**] [**Grade LD-2**] particleboard.

Consider deleting "Blocking" Subparagraph below. Some door manufacturers contend that blocking weakens particleboard-core doors and is not required. If retaining subparagraph, retain one of two options.

- 1) Blocking: Provide wood blocking in particleboard-core doors as [**needed to eliminate through-bolting hardware.**] [**follows:**]

If retaining "Blocking" Subparagraph and second option above, retain first three subparagraphs below for blocking required.

- a) **5-inch (125-mm)** top-rail blocking, in doors indicated to have closers.
- b) **5-inch (125-mm)** bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
- c) **5-inch (125-mm)** midrail blocking, in doors indicated to have exit devices.

Usually delete requirement for midrail blocking in last subparagraph above and retain first subparagraph below.

- 2) Provide doors with **[glued-wood-stave] [or] [WDMA I.S. 10 structural-composite-lumber]** cores instead of particleboard cores for doors scheduled to receive exit devices in **[Section 087100 "Door Hardware."]** **[Section 087111 "Door Hardware (Descriptive Specification.)"]**
- b. Glued wood stave.
- c. WDMA I.S. 10 structural composite lumber.

In each of first two subparagraphs below, first option is for Extra Heavy Duty performance grade, second option is for Heavy Duty performance grade.

- 1) Screw Withdrawal, Face: **[550 lbf (2440 N)] [475 lb (2110 N)]**.
- 2) Screw Withdrawal, Edge: **[550 lbf (2440 N)] [475 lb (2110 N)]**.
- d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
8. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
  - a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as **[needed to eliminate through-bolting hardware.] [follows:]**

Retain "Blocking for Mineral-Core Doors" Subparagraph above and first four subparagraphs below only after verifying availability for fire-protection rating required. Delete first four subparagraphs below if retaining first option above.

- 1) **5-inch (125-mm)** top-rail blocking.
- 2) **5-inch (125-mm)** bottom-rail blocking, in doors indicated to have protection plates.
- 3) **5-inch (125-mm)** midrail blocking, in doors indicated to have armor plates.
- 4) **[4-1/2-by-10-inch (114-by-250-mm) lock blocks] [5-inch (125-mm) midrail blocking]**, in doors indicated to have exit devices.
9. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

## 2.4 SOLID-CORE FIVE-PLY FLUSH WOOD DOORS FOR OPAQUE FINISH

Retain this article for traditional five-ply flush wood doors.

Insert drawing designation, if applicable, for each product required. Use these designations on Drawings to identify each product.

- A. Exterior Doors, Solid-Core Five-Ply for Opaque Finish **<Insert drawing designation>**:

1. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**

Retain "Performance Grade" Subparagraph below to specify performance grade if referencing WDMA I.S. 1A.

2. Performance Grade: ANSI/WDMA I.S. 1A [**Extra Heavy Duty**] [**Heavy Duty**] [**as indicated on Drawings**].
3. [**Architectural Woodwork Standards**] [ANSI/WDMA I.S. 1A] Grade: [**Premium**] [**Custom**].

First option in "Faces" Subparagraph below is highest quality. Coordinate with requirements of door grade selected.

4. Faces: [**MDO**] [**Any closed-grain hardwood of mill option**].
  - a. Apply MDO to [**standard-thickness, closed-grain, hardwood face veneers**] [**or**] [**directly to high-density hardboard crossbands**].

Retain option in "Exposed Vertical( and Top) Edges" Subparagraph below if top edges of doors are visible, such as doors in multistory spaces.

5. Exposed Vertical[ **and Top**] Edges: Any closed-grain hardwood.
6. Core:

Retain one of first four subparagraphs below. Particleboard cores are not generally recommended for exterior doors.

- a. ANSI A208.1, [**Grade LD-1**] [**Grade LD-2**] particleboard.
- b. Glued wood stave.
- c. WDMA I.S. 10 structural composite lumber.

In each of first two subparagraphs below, first option is for Extra Heavy Duty performance grade, second option is for Heavy Duty performance grade.

- 1) Screw Withdrawal, Face: [**550 lbf (2440 N)**] [**475 lb (2110 N)**].
- 2) Screw Withdrawal, Edge: [**550 lbf (2440 N)**] [**475 lb (2110 N)**].
- d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
7. Construction: Five plies, hot-pressed, bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.
8. Adhesives: Type I in accordance with WDMA T.M. 6.

Insert drawing designation, if applicable, for each product required. Use these designations on Drawings to identify each product.

B. Interior Doors, Solid-Core Five-Ply for Opaque Finish <Insert drawing designation>:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain "Performance Grade" or "Performance Grade by Location" Subparagraph below to specify performance grade if referencing ANSI/WDMA I.S. 1A.

2. Performance Grade: ANSI/WDMA I.S. 1A [**Extra Heavy Duty**] [**Heavy Duty**] [**Standard Duty**] [**as indicated on Drawings**].
3. Performance Grade by Location:

- a. ANSI/WDMA I.S. 1A Extra Heavy Duty: **[Classrooms] [public toilets] [janitor's closets] [assembly spaces] [exits] [and] [patient rooms] <Insert locations> [and where indicated on Drawings].**
- b. ANSI/WDMA I.S. 1A Standard Duty: **[Closets (not including janitor's closets)] [and] [private toilets] <Insert locations> [and where indicated on Drawings].**
- 4. **[Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom].**

First option in "Faces" Subparagraph below is highest quality; last is most economical. Coordinate with requirements of door grade selected.

- 5. Faces: **[MDO] [Any closed-grain hardwood of mill option] [Hardboard or MDF].**
  - a. Apply MDO to **[standard-thickness, closed-grain, hardwood face veneers] [or] [directly to high-density hardboard crossbands].**
  - b. Hardboard Faces: ANSI A135.4, Class 1 (tempered) or Class 2 (standard).
  - c. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.

Retain option in "Exposed Vertical( and Top) Edges" Subparagraph below if top edges of doors are visible, such as doors in multistory spaces.

- 6. Exposed Vertical[ **and Top**] Edges: Any closed-grain hardwood.
  - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
  - b. Fire-Rated Pairs of Doors:

Retain one of first two subparagraphs below. Retain first subparagraph if steel edges and astragals are unacceptable. Coordinate availability and ratings with manufacturers. Retain second subparagraph if steel edges and astragals are acceptable.

- 1) 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.
- 2) Provide formed-steel edges and astragals with intumescent seals.
  - a) Finish steel edges and astragals with baked enamel[ **same color as doors**].

Retain last subparagraph above or first subparagraph below; delete option above if edges and astragals are field painted.

- b) Finish steel edges and astragals to match door hardware (locksets or exit devices).
- c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

Requirements in "Screw-Holding Capability" Subparagraph below are from WDMA I.S. 1A. Options are performance duty levels for Extra Heavy Duty, Heavy Duty, and Standard Duty, respectively. Before retaining, verify that products comply with requirement selected.

- 1) Screw-Holding Capability: [**550 lbf (2440 N)**] [**475 lbf (2110 N)**] [**400 lbf (1780 N)**] in accordance with WDMA T.M. 10.

7. Core for Non-Fire-Rated Doors:

Retain one or more of first four subparagraphs below.

- a. ANSI A208.1, [**Grade LD-1**] [**Grade LD-2**] particleboard.

Consider deleting "Blocking" Subparagraph below. Some door manufacturers contend that blocking weakens particleboard-core doors and is not required. If retaining subparagraph, retain one of two options.

- 1) Blocking: Provide wood blocking in particleboard-core doors as [**needed to eliminate through-bolting hardware.**] [**follows:**]

If retaining "Blocking" Subparagraph and second option above, retain first three subparagraphs below for blocking required.

- a) **5-inch (125-mm)** top-rail blocking, in doors indicated to have closers.
- b) **5-inch (125-mm)** bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
- c) **5-inch (125-mm)** midrail blocking, in doors indicated to have exit devices.

Usually delete requirement for midrail blocking in last subparagraph above and retain first subparagraph below.

- 2) Provide doors with [**glued-wood-stave**] [**or**] [**WDMA I.S. 10 structural-composite-lumber**] cores instead of particleboard cores for doors scheduled to receive exit devices in [**Section 087100 "Door Hardware."**] [**Section 087111 "Door Hardware (Descriptive Specification)."**]

- b. Glued wood stave.
- c. WDMA I.S. 10 structural composite lumber.

In each of first two subparagraphs below, first option is for Extra Heavy Duty performance grade, second option is for Heavy Duty performance grade.

- 1) Screw Withdrawal, Face: [**550 lbf (2440 N)**] [**475 lb (2110 N)**].
- 2) Screw Withdrawal, Edge: [**550 lbf (2440 N)**] [**475 lb (2110 N)**].

- d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.

8. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.

- a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as **[needed to eliminate through-bolting hardware.] [follows:]**

Retain "Blocking for Mineral-Core Doors" Subparagraph above and first four subparagraphs below only after verifying availability for fire-protection rating required. Delete first four subparagraphs below if retaining first option above.

- 1) **5-inch (125-mm)** top-rail blocking.
  - 2) **5-inch (125-mm)** bottom-rail blocking, in doors indicated to have protection plates.
  - 3) **5-inch (125-mm)** midrail blocking, in doors indicated to have armor plates.
  - 4) **[4-1/2-by-10-inch (114-by-250-mm) lock blocks] [5-inch (125-mm) midrail blocking]**, in doors indicated to have exit devices.
9. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

## 2.5 SOLID-CORE FLUSH WOOD DOORS WITH PLASTIC-LAMINATE FACES

Insert drawing designation, if applicable, for each product required. Use these designations on Drawings to identify each product.

- A. Interior Doors, Solid Core with Plastic-Laminate Faces **<Insert drawing designation>**:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain "Performance Grade" or "Performance Grade by Location" Subparagraph below to specify performance grade if referencing ANSI/WDMA I.S. 1A.

2. Performance Grade: ANSI/WDMA I.S. 1A **[Extra Heavy Duty] [Heavy Duty] [Standard Duty] [as indicated on Drawings]**.
3. Performance Grade by Location:
  - a. ANSI/WDMA I.S. 1A Extra Heavy Duty: **[Classrooms] [public toilets] [janitor's closets] [assembly spaces] [exits] [and] [patient rooms] <Insert locations> [and where indicated on Drawings]**.
  - b. ANSI/WDMA I.S. 1A Standard Duty: **[Closets (not including janitor's closets)] [and] [private toilets] <Insert locations> [and where indicated on Drawings]**.
4. **[Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom]**.

Retain one of two options in "Plastic-Laminate Faces" Subparagraph below, usually the first one. First is typical 0.048-inch- (1.2-mm-) thick material; second is 0.118-inch- (3.0-mm-) thick material made specifically for doors and is expensive. Before specifying second option, verify availability with manufacturers.

5. Plastic-Laminate Faces: High-pressure decorative laminates complying with ISO 4586-3, **[Grade HGS] [Grade HSH]**.

Revise "Colors, Patterns, and Finishes" Subparagraph below to indicate color, pattern, and finish if preselected.

6. Colors, Patterns, and Finishes: **[As indicated] [As selected by Architect from laminate manufacturer's full range of products].**

Retain first option in "Exposed Vertical( and Top) Edges" Subparagraph below if top edges of doors are visible, such as doors in multistory spaces. Retain one of four remaining options; last two require factory prefitting. Impact-resistant polymer edging is standard for some manufacturers.

7. Exposed Vertical[ **and Top**] Edges: **[Hardwood edges for staining to match faces] [Hardwood edges for painting] [Plastic laminate that matches faces, applied before faces] [or] [impact-resistant polymer edging, applied after faces].**
  - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
  - b. Fire-Rated Pairs of Doors:

Retain one of first two subparagraphs below. Retain first subparagraph if steel edges and astragals are unacceptable. Coordinate availability and ratings with manufacturers. Retain second subparagraph if steel edges and astragals are acceptable.

- 1) 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.
- 2) Provide formed-steel edges and astragals with intumescent seals.
  - a) Finish steel edges and astragals with baked enamel[ **same color as doors**].

Retain last subparagraph above or first subparagraph below; delete option above if edges and astragals are field painted.

- b) Finish steel edges and astragals to match door hardware (locksets or exit devices).
- c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

Requirements in "Screw-Holding Capability" Subparagraph below are from ANSI/WDMA I.S. 1A. Options are performance duty levels for Extra Heavy Duty, Heavy Duty, and Standard Duty, respectively. Before retaining, verify that products comply with requirement selected.

- 1) Screw-Holding Capability: **[550 lbf (2440 N)] [475 lbf (2110 N)] [400 lbf (1780 N)]** in accordance with WDMA T.M. 10.
8. Core for Non-Fire-Rated Doors:

Retain one of first four subparagraphs below.

- a. ANSI A208.1, **[Grade LD-1] [Grade LD-2]** particleboard.

Consider deleting "Blocking" Subparagraph below. Some door manufacturers contend that blocking weakens particleboard-core doors and is not required. If retaining subparagraph, retain one of two options.

- 1) Blocking: Provide wood blocking in particleboard-core doors as **[needed to eliminate through-bolting hardware.] [follows:]**

If retaining "Blocking" Subparagraph and second option above, retain first three subparagraphs below for blocking required.

- a) **5-inch (125-mm)** top-rail blocking, in doors indicated to have closers.
- b) **5-inch (125-mm)** bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
- c) **5-inch (125-mm)** midrail blocking, in doors indicated to have exit devices.

Usually delete requirement for midrail blocking in last subparagraph above and retain first subparagraph below.

- 2) Provide doors with **[glued-wood-stave] [or] [WDMA I.S. 10 structural-composite-lumber]** cores instead of particleboard cores for doors scheduled to receive exit devices in **[Section 087100 "Door Hardware."]** **[Section 087111 "Door Hardware (Descriptive Specification)."]**
- b. Glued wood stave.
- c. WDMA I.S. 10 structural composite lumber.

In each of first two subparagraphs below, first option is for Extra Heavy Duty performance grade, second option is for Heavy Duty performance grade.

- 1) Screw Withdrawal, Face: **[550 lbf (2440 N)] [475 lb (2110 N)]**.
  - 2) Screw Withdrawal, Edge: **[550 lbf (2440 N)] [475 lb (2110 N)]**.
  - d. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
9. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
    - a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as **[needed to eliminate through-bolting hardware.] [follows:]**

Retain "Blocking for Mineral-Core Doors" Subparagraph above and first four subparagraphs below only after verifying availability for fire-protection rating required. Delete first four subparagraphs below if retaining first option above.

- 1) **5-inch (125-mm)** top-rail blocking.
- 2) **5-inch (125-mm)** bottom-rail blocking, in doors indicated to have protection plates.
- 3) **5-inch (125-mm)** midrail blocking, in doors indicated to have armor plates.



- 4) **[4-1/2-by-10-inch (114-by-250-mm) lock blocks] [5-inch (125-mm) midrail blocking]**, in doors indicated to have exit devices.

10. Construction:

Retain one of two subparagraphs below. Glued-wood-stave core is only allowed with five-ply construction. See the Evaluations.

- a. Three plies, **[hot-pressed] [or] [cold-pressed]** bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before faces are applied.
- b. Five plies, **[hot-pressed] [or] [cold-pressed]** bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before faces and crossbands are applied.

## 2.6 HOLLOW-CORE FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

Insert drawing designation, if applicable, for each product required. Use these designations on Drawings to identify each product.

### A. Interior Doors, Hollow-Core Veneer Faced <Insert drawing designation>:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
2. Performance Grade: ANSI/WDMA I.S. 1A Standard Duty.
3. **[Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom].**

Options in "Species" Subparagraph below are examples only; revise or insert another species.

4. Species: **[Anigre] [Select white ash] [Figured select white ash] [Select white birch] [Select red birch] [Cherry] [Select red gum] [Figured select red gum] [Select white maple] [Red oak] [White oak] [Persimmon] [Sapele] [Sycamore] [Walnut] <Insert species>.**

First option in "Cut" Subparagraph below applies only to oak.

5. Cut: **[Rotary cut] [Plain sliced (flat sliced)] [Quarter sliced] [Rift cut].**
6. Match between Veneer Leaves: **[Book] [Slip] [Random] match.**

In "Assembly of Veneer Leaves on Door Faces" Subparagraph below, first option is standard for Premium-grade doors. Third option is standard for Custom-grade doors.

7. Assembly of Veneer Leaves on Door Faces: **[Center-balance] [Balance] [Running] match.**
8. Pair and Set Match: Provide for doors hung in same opening **[or separated only by mullions].**

Retain first option in "Exposed Vertical( and Top) Edges" Subparagraph below if top edges of doors are visible, such as doors in multistory spaces. Retain one of four remaining options; last two require factory prefitting.

9. Exposed Vertical **[and Top] Edges: [Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A] [Same species as faces - Architectural Woodwork Standards edge Type A] [Applied wood-veneer edges of**

same species as faces and covering edges of faces - Architectural Woodwork Standards edge Type B] [Applied wood edges of same species as faces and covering edges of crossbands - Architectural Woodwork Standards edge Type D].

Retain "Construction" Subparagraph below for ANSI/WDMA I.S. 1A. An institutional core requires 6- to 12-inch (152- to 300-mm) top and bottom rail blocking; a standard core requires only 1-1/8-inch (29-mm) rails.

10. Construction: [Institutional] [Standard] hollow core.
11. Blocking: Provide wood blocking with minimum dimensions as follows:
  - a. 5-by-18-inch (125-by-460-mm) lock blocks[ at both stiles].

Blocking in first subparagraph above is usually standard; three subparagraphs below are optional features. Delete blocking not required.

- b. 5-inch (125-mm) top-[ and bottom-]rail blocking.
- c. 10-inch (250-mm) [ top- and] bottom-rail blocking.
- d. 2-1/2-inch (64-mm) midrail blocking.

## 2.7 HOLLOW-CORE FLUSH WOOD DOORS FOR OPAQUE FINISH

Insert drawing designation, if applicable, for each product required. Use these designations on Drawings to identify each product.

### A. Interior Doors, Hollow Core for Opaque Finish <Insert drawing designation>:

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
2. Performance Grade: ANSI/WDMA I.S. 1A Standard Duty.
3. [Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom].

First option in "Faces" Subparagraph below is higher quality than second option. Coordinate with requirements of door grade selected.

4. Faces: [Any closed-grain hardwood of mill option] [Hardboard or MDF].
  - a. Hardboard Faces: ANSI A135.4, Class 1 (tempered) or Class 2 (standard).
  - b. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.

Retain option in "Exposed Vertical( and Top) Edges" Subparagraph below if top edges of doors are visible, such as doors in multistory spaces.

5. Exposed Vertical[ and Top] Edges: Any closed-grain hardwood.

Retain "Construction" Subparagraph below for ANSI/WDMA I.S. 1A. An institutional core requires 6- to 12-inch (152- to 302-mm) top and bottom rail blocking; a standard core requires only 1-1/8-inch (29-mm) rails.

6. Construction: [Institutional] [Standard] hollow core.
7. Blocking: Provide wood blocking with minimum dimensions as follows:
  - a. 5-by-18-inch (125-by-460-mm) lock blocks[ at both stiles].

Blocking in first subparagraph above is usually standard; three subparagraphs below are optional features. Delete blocking not required.

- b. 5-inch (125-mm) top-[ **and bottom**]-rail blocking.
- c. 10-inch (250-mm)[ **top- and**] bottom-rail blocking.
- d. 2-1/2-inch (64-mm) midrail blocking.

## 2.8 HOLLOW-CORE FLUSH WOOD DOORS WITH PLASTIC-LAMINATE-FACES

Insert drawing designation, if applicable, for each product required. Use these designations on Drawings to identify each product.

A. Interior Doors, Hollow Core with Plastic-Laminate-Faces <Insert drawing designation>:

- 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- 2. Performance Grade: ANSI/WDMA I.S. 1A Standard Duty.
- 3. [Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom].

Retain one of two options in "Plastic-Laminate Faces" Subparagraph below, usually the first one. First is typical 0.048-inch- (1.2-mm-) thick material; second is 0.118-inch- (3.0-mm-) thick material made specifically for doors and is expensive. Before specifying second option, verify availability with manufacturers.

- 4. Plastic-Laminate Faces: High-pressure decorative laminates complying with ISO 4586-3, [Grade HGS] [Grade HSH].

Revise "Colors, Patterns, and Finishes" Subparagraph below to indicate color, pattern, and finish if preselected.

- 5. Colors, Patterns, and Finishes: [As indicated] [As selected by Architect from laminate manufacturer's full range of products].

Retain first option in "Exposed Vertical( and Top) Edges" Subparagraph below if top edges of doors are visible, such as doors in multistory spaces. Retain one of four remaining options; last two require factory prefitting.

- 6. Exposed Vertical[ **and Top**] Edges: [Hardwood edges for staining to match faces] [Hardwood edges for painting] [Plastic laminate that matches faces, applied before faces] [Impact-resistant polymer edging, applied after faces].

Third option in "Polymer Edging Color" Subparagraph below can be expensive.

- a. Polymer Edging Color: [Beige] [Brown] [Same color as faces].

Retain "Construction" Subparagraph below for ANSI/WDMA I.S. 1A. An institutional core requires 6- to 12-inch (152- to 302-mm) top and bottom rail blocking; a standard core requires only 1-1/8-inch (29-mm) rails.

- 7. Construction: [Institutional] [Standard] hollow core.
- 8. Blocking: Provide wood blocking with minimum dimensions as follows:
  - a. 5-by-18-inch (125-by-460-mm) lock blocks[ **at both stiles**].

Blocking in first subparagraph above is usually standard; three subparagraphs below are optional features. Delete blocking not required.

- b. 5-inch (125-mm) top-[ and bottom-]rail blocking.
- c. 10-inch (250-mm) [ top- and] bottom-rail blocking.
- d. 2-1/2-inch (64-mm) midrail blocking.

## 2.9 FIRE-RATED WOOD DOOR FRAMES

### A. Interior Fire-Rated Door Frames:

- 1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- 2. [Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom].

Retain "Wood Species and Cut" Subparagraph below if frames and jambs match doors. Otherwise, retain both "Species" and "Cut" subparagraphs below.

- 3. Wood Species and Cut: Match species and cut indicated for wood doors unless otherwise indicated.

Options in "Species" Subparagraph below are examples only; revise or insert another species.

- 4. Species: [Anigre] [Select white ash] [Figured select white ash] [Select white birch] [Select red birch] [Cherry] [Select red gum] [Figured select red gum] [Select white maple] [Red oak] [White oak] [Persimmon] [Sapele] [Sycamore] [Walnut] <Insert species>.

First option in "Cut" Subparagraph below applies only to oak.

- 5. Cut: [Plain sliced/plain sawn] [Quarter cut/quarter sawn] [Rift cut/rift sawn].

Retain one of three options in "Wood Moisture Content" Paragraph below. First range applies to Ontario, Quebec, and most of the United States. Second applies to damp coastal areas of southern United States and Maritime Provinces. Third applies to dry southwestern United States, Alberta, Manitoba, and Saskatchewan. See relative-humidity and moisture-content map in AWI/AWMCA/WT's "Architectural Woodwork Standards." Some locations have microclimates that differ from the surrounding region.

- 6. Wood Moisture Content: [5 to 10] [8 to 13] [4 to 9] percent.
- 7. Profile: [T-stop] [Flat] [Single rabbet] [Double rabbet] [As indicated on Drawings].
- 8. Construction: Solid lumber, fire-retardant particleboard, or fire-retardant medium density fiberboard (MDF) with veneered exposed surfaces and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated on Drawings.

## 2.10 LIGHT FRAMES AND LOUVERS

Retain one or more of "Wood Beads for Light Openings in Wood Doors," "Wood-Veneered Beads for Light Openings in Fire-Rated Doors," and "Metal Frames for Light Openings in Fire-Rated Doors" paragraphs below if light openings are required.

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

Retain one of three options in "Wood Species" Subparagraph below.

1. Wood Species: [Same species as door faces] [Species compatible with door faces] [Any closed-grain hardwood].

Retain one of five options in "Profile" Subparagraph below, or revise to suit Project.

2. Profile: [Flush rectangular beads] [Recessed tapered beads] [Recessed tapered beads with exposed banding] [Lipped tapered beads] [Manufacturer's standard shape].

Retain subparagraph below if required.

3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

Retain "Wood-Veneered Beads for Light Openings in Fire-Rated Doors" or "Metal Frames for Light Openings in Fire-Rated Doors" Paragraph below if required for doors with fire-protection rating exceeding 20 minutes.

- 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 on Drawings. 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-~~ (1.2-mm-) thick, cold-rolled steel sheet; [factory primed for paint] [with baked-enamel- or powder-coated] finish; and approved for use in doors of fire-protection rating indicated on Drawings.
- D. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.

Retain one of three options in "Wood Species" Subparagraph below.

1. Wood Species: [Same species as door faces] [Species compatible with door faces] [Any closed-grain hardwood].
2. Profile: [Flat] [Chevron].

E. Metal Louvers:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
2. Blade Type: [Vision-proof, inverted V] [Vision-proof, inverted Y] [Darkroom-type, double inverted V].
3. Metal and Finish:

Retain one of three subparagraphs below.

- a. Hot-dip galvanized steel, ~~0.040 inch~~ (1.0 mm) thick, [factory primed for paint] [with baked-enamel- or powder-coated] finish.
- b. Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.
- c. Extruded aluminum with [light bronze] [medium bronze] [dark bronze] [black], Class II, color anodic finish, AA-M12C22A32/A34.

- F. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  2. Metal and Finish: Hot-dip galvanized steel, **0.040 inch (1.0 mm)** thick, [**factory primed for paint**] [**with baked-enamel- or powder-coated**] finish.

## 2.11 FABRICATION

Typically, retain first paragraph below. Retain paragraph and revise to indicate exceptions if only some doors are required to be factory fitted. Plastic-laminate-edged and factory-finished doors must be factory fitted and machined. Fire-rated and plastic-laminate-faced doors with wood edges should also be factory fitted and machined.

Standard fitting may be inadequate for doors 2-1/2 inches (64 mm) thick or more or for doors exposed to wide changes in humidity and temperature.

- A. Factory fit doors to suit frame-opening sizes indicated.
1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  2. Comply with NFPA 80 requirements for fire-rated doors.

Typically, retain first paragraph below. Retain paragraph and revise to indicate exceptions if only some doors are required to be factory machined.

- B. Factory machine doors for hardware that is not surface applied.
1. Locate hardware to comply with DHI-WDHS-3.
  2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.

Retain first subparagraph below for metal frames for wood doors.

3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.

Retain "Metal Astragals" Subparagraph below with pairs of factory-fitted, fire-rated doors where astragals, etc., are required.

5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

- C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.

"Glazing" Subparagraph below is unnecessary if using only metal light frames.

2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

3. Louvers: Factory install louvers in prepared openings.

Retain "Exterior Doors" Paragraph below to provide additional weather resistance at exterior doors.

- D. Exterior Doors: Factory treat exterior doors with water repellent after fabrication has been completed but before factory [**priming**] [**finishing**].

Retain subparagraph below for outswinging exterior doors. Before retaining, verify availability with manufacturers or delete and include with weather stripping in Section 087100 "Door Hardware" or Section 087111 "Door Hardware (Descriptive Specification)."

1. Flash top of outswinging doors with manufacturer's standard metal flashing.

## 2.12 FACTORY PRIMING

Retain this article if field-finished doors are required to be factory primed. Factory fitting is recommended to minimize damage to factory-primed doors.

- A. Doors for Opaque Finish: Factory prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in [**Section 099113 "Exterior Painting."**] [**Section 099123" Interior Painting."**]

## 2.13 FACTORY FINISHING

Retain this article if factory finishing is required. Factory finishing can be used to help comply with sustainable design requirements, which limit VOC content of paints and coatings used within buildings. Factory finishing also has other advantages. See the Evaluations.

- A. Comply with referenced quality standard for factory finishing.
  1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  2. Finish faces, all four edges, edges of cutouts, and mortises.
  3. Stains and fillers may be omitted on[ **top and**] bottom edges, edges of cutouts, and mortises.

Retain one of first three paragraphs below.

- B. Factory finish doors.
- C. Factory finish doors that are indicated on Drawings to receive transparent finish.
- D. Factory finish doors where indicated in schedules or on Drawings as factory finished.
- E. Transparent Finish:

In "(Architectural Woodwork Standards) (ANSI/WDMA I.S. 1A) Grade" Subparagraph below, usually retain same grade for finish as specified for doors.



1. [Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom].

Retain one of first seven subparagraphs below, or insert another finish system. Before specifying, verify availability of finishes with manufacturers. Finish systems vary among manufacturers. Most manufacturers offer AWS System-9 or ANSI/WDMA I.S. 1A TR-8 as standard. Require Samples for verification.

2. Architectural Woodwork Standards System-5, Varnish, Conversion.
3. Architectural Woodwork Standards System-9, UV Curable, Acrylated Epoxy, Polyester or Urethane.
4. Architectural Woodwork Standards System-10, UV Curable, Water Based.
5. Architectural Woodwork Standards System-11, Polyurethane, Catalyzed.
6. ANSI/WDMA I.S. 1A TR-4 Conversion Varnish.
7. ANSI/WDMA I.S. 1A TR-6 Catalyzed Polyurethane.
8. ANSI/WDMA I.S. 1A TR-8 UV Cured Acrylated Polyester/Urethane.

Retain one of three options in "Staining" Subparagraph below.

9. Staining: [Match Architect's sample] [As selected by Architect from manufacturer's full range] [None required].

Retain one of two options in "Sheen" Subparagraph below, or revise to suit Project.

10. Sheen: [Satin] [Semigloss].

F. Opaque Finish:

In "(Architectural Woodwork Standards) (ANSI/WDMA I.S. 1A) Grade" Subparagraph below, usually retain same grade for finish as specified for doors.

1. [Architectural Woodwork Standards] [ANSI/WDMA I.S. 1A] Grade: [Premium] [Custom].

Retain one of first six subparagraphs below, or insert another finish system. Before specifying, verify availability of finishes with manufacturers. Finish systems vary among manufacturers.

2. Architectural Woodwork Standards System-5, Varnish, Conversion.
3. Architectural Woodwork Standards System-9, UV Curable, Acrylated Epoxy, Polyester, or Urethane.
4. Architectural Woodwork Standards System-10, UV Curable, Water Based.
5. Architectural Woodwork Standards System-11, Polyurethane, Catalyzed.
6. ANSI/WDMA I.S. 1A OP-4 Conversion Varnish.
7. ANSI/WDMA I.S. 1A OP-6 Catalyzed Polyurethane.
8. Color: [Match Architect's sample] [As selected by Architect from manufacturer's full range].

Retain one of three options in "Sheen" Subparagraph below, or revise to suit Project.

9. Sheen: [Satin] [Semigloss] [Gloss].



## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Hardware: For installation, see [Section 087100 "Door Hardware."] [Section 087111 "Door Hardware (Descriptive Specification)."]
- B. Install doors[ **and frames**] to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Install frames level, plumb, true, and straight.
  - 1. Shim as required with concealed shims. Install level and plumb to a tolerance of **1/8 inch in 96 inches (3.2 mm in 2400 mm)**.
  - 2. Anchor frames to anchors or blocking built in or directly attached to substrates.
    - a. Secure with countersunk, concealed fasteners and blind nailing.
    - b. Use fine finishing nails[ **or finishing screws**] for exposed fastening, countersunk and filled flush with woodwork.
      - 1) For factory-finished items, use filler matching finish of items being installed.

Retain first subparagraph below for fire-rated doors and frames.

- 3. Install fire-rated doors and frames in accordance with NFPA 80.

Retain subparagraph below for smoke- and draft-control doors. The IBC requires fire door assemblies to comply with smoke- and draft-control requirements in corridors, smoke barriers, and smoke partitions.

- 4. Install smoke- and draft-control doors in accordance with NFPA 105.

Retain "Job-Fitted Doors" Paragraph below if all doors are not factory fitted. Factory fitting of fire-rated doors is preferred to job fitting, because of limitations on trimming narrower stiles and rails.

- D. Job-Fitted Doors:
  - 1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
    - a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
  - 2. Machine doors for hardware.
  - 3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  - 4. Clearances:

Clearances in first three subparagraphs below describe typical prefabricated clearances; revise to suit office practice and for doors thicker than 1-3/4 inches (44 mm).

- a. Provide **1/8 inch (3.2 mm)** at heads, jambs, and between pairs of doors.

- b. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
- c. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

Retain first subparagraph below for fire-rated doors or if doors are not factory fitted.

- d. Comply with NFPA 80 for fire-rated doors.
5. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.

Last subparagraph above is standard bevel; revise to suit Project if required. See the Evaluations. Retain subparagraph below for fire-rated doors or if not factory fitted. Fire-rated doors can be trimmed only to a limited extent, because of narrow stiles and rails.

- 6. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### 3.2 FIELD QUALITY CONTROL

Retaining second option in "Inspection Agency" Paragraph is typical. If retaining second option in "Inspection Agency" Paragraph, retain "Field quality-control reports" Paragraph in "Informational Submittals."

- A. Inspection Agency: [Owner will engage] [Engage] a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
  - 1. Provide inspection of installed Work through [AWI's Quality Certification Program] [WI's Certified Compliance Program], certifying that wood doors and frames, including installation, comply with requirements of AWI/AWMCA/WI's "Architectural Woodwork Standards" for the specified grade.
  - 2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.

Retain "Egress Door Inspections" Subparagraph below for projects under NFPA 101, for Assembly, Educational, Day-Care, and Residential Board and Care occupancies.

- 3. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in [NFPA 80] [and] [NFPA 101].

### 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 081713 - INTEGRATED METAL CLAD DOOR ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Metal clad swing door assemblies.

#### 1.2 SUBMITTALS

- A. Product Data: Include manufacturers' product sheet for specified products.
- B. Shop Drawings: Manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations, and installation details.
- C. Samples: For finishes, colors, and textures. Coordinate with Division 09 Section "Painting." Section for paint finishes.
- D. Certificates: Product certificates signed by the manufacturer certifying that materials comply with specified performance characteristics and criteria and physical requirements.
- E. Warranty: Warranty documents specified herein.

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced in performing work of this section and specialized in the installation of work similar to that required for this Project.
- B. Regulatory requirements: Specify applicable requirements of regulatory agencies.
  - 1. Labeled Door and frame construction. Where noted or required provide UL or Warnock Hersey labels with appropriate fire and or smoke resistance ratings for the opening as indicated.
- C. Window and Door Manufacturers Association (WDMA):
  - 1. ANSI/AAMA/NWDA 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
  - 2. 2ANSI/AAMA/NWDA 101/I.S.2/NAFS-02 - Voluntary Performance Specification for Windows, Skylights and Glass Doors.
  - 3. WDMA I.S.4 - Industry Standard for Water-Repellent Preservative Non-Pressure Treatment for Millwork.

#### 1.4 PROJECT CONDITIONS

- A. Field measurements: Verify actual measurements/openings by field measurements before fabrication: show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

#### 1.5 WARRANTY

- A. Manufacturer's warranty: Submit for owner's acceptance, manufacture's standard warranty documented by an authorized company official.
  - 1. Manufacturer's warranty commencing on shipment date.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Basis of Design: Subject to compliance with requirements, provide **Marvin 'Elevate' Series** or comparable products from the following manufacturers:
  - 1. Jeld-Wen, Inc.
  - 2. Kolbe Windows & Doors
  - 3. Lincoln Wood Products, Inc.
  - 4. Pella Corporation
  - 5. Ply-Gem, a division of Cornerstone Building Brands
  - 6. Weather Shield Mfg, Inc.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Door Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.30 cfm per square foot of frame or less.
- B. Door Unit Water Penetration: No water penetration through door unit when tested in accordance with ASTM E 331 with water applied at rate of 5 gallons per hour per square foot. Doors with low profile sill (ADA) shall have water resistance rating of 0 psf.
- C. **U Value: 0.29.**
- D. **SHGC: 0.28.**
- E. Min Clear Opening Dimensions: 32" (2'-8") wide by 80" (6'-8") high with door opened at 90-degrees (excludes hardware)

#### 2.3 MATERIALS

- A. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.

- B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

## 2.4 METAL DOOR ASSEMBLY

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces. Comply with ANSI A250.8.
- B. Doors: 1-3/4 inch thick
  - 1. Latch and deadbolt blocking: integral solid wood reinforcement.
  - 2. Core: Manufacturers standard wood core
  - 3. Exterior Cladding: Extruded aluminum  
Interior Exposed Surfaces: Hardwood veneer
    - a. Species: Manufacturer's standard.
  - 4. Lock Block: 12-inches, solid wood.
  - 5. Bottom Rail: 10" minimum height
- C. Frames:
  - 1. Select softwood, water-repellent, preservative-treated in accordance with WDMA I.S.4 at head and jambs.
  - 2. Interior Exposed Surfaces: Wood veneer to match door.
  - 3. Exterior Surfaces: Clad with manufacturer's standard aluminum at head and jambs.
  - 4. Threshold: Manufacturer's standard two-piece or barrier-free ADA-compliant type as indicated of extruded aluminum, mill finish with safety ribs, 4 inches (102 mm) wide by 1/2 inch (13 mm) height; ribbed extruded vinyl sweep across door bottom.
  - 5. Overall Frame Depth: As required to fit opening.

## 2.5 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF or FEVE resin by weight in color coat.
  - 1. Color: As selected by Architect from manufacturer's full range

## 2.6 WOOD FINISHES

- A. Wood Finish: Manufacturer's standard primer finish for field finish painting

## 2.7 HARDWARE

- A. Hinges: 4 inch by 4 inch (102 mm by 102 mm) 0.100-inch thick cold-rolled steel with stainless steel ball bearings and non-removal pin.

- B. Frames are prepared for hardware to match door panel boring. Frame latch bore is for adjustable T-style latch strike.
- C. Weather Strip:
  - 1. Head and Jambs: Manufacturer's standard closed-cell foam wrapped with vinyl jacket installed in kerf of frame at head and jambs.
  - 2. Sill: Dual-durometer bulb extruded polymer on threshold shall contact face of door panel.
- D. Hardware Preparation: Factory prepared for hardware as indicated in Division 08 Section "Door Hardware."

## 2.8 ACCESSORIES

- A. Glazing
  - 1. Tempered Glass: ASTM C 1048.
  - 2. Type: Manufacturers standard tempered low-e insulating glass installed into high performance glazing frames.

## 2.9 TOLERANCES

- A. Doors shall accommodate the following opening tolerances:
  - 1. Vertical Dimensions Between High and Low Points: Plus 1/4 inch, minus 0 inch.
  - 2. Width Dimensions: Plus 1/4 inch, minus 0 inch.
  - 3. Building Columns or Masonry Openings: Plus or minus 1/4 inch from plumb.
  - 4. Frame finish: Factory-applied.

## 2.10 INSTALLATION ACCESSORIES

- A. Flashing/Sealant Tape: UV resistant aluminum-foil-backed butyl flashing tape, 0.013 inch (0.33 mm) thick
- B. Insulating-Foam Sealant: Low-pressure, polyurethane window and door insulating-foam sealant.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and approved shop drawings.
- B. Install doors to be weather-tight and freely operating.
- C. Maintain alignment with adjacent work.
- D. Secure assembly to framed openings, plumb and square, without distortion.
- E. Integrate door assembly installation with exterior weather-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with weather-resistant barrier using watershed principles in accordance with door manufacturer's instructions.
- F. Place interior seal around door perimeter to maintain continuity of building thermal and air barrier using insulating-foam sealant.
- G. Seal door to exterior wall cladding with sealant and related backing materials at perimeter of assembly.
- H. Leave doors closed.

### 3.3 ADJUSTING

- A. Adjust hinge sets, locksets and other hardware. Lubricate using a suitable lubricant compatible with door and frame coatings.

### 3.4 CLEANING

- A. Clean door and window frames and glass in accordance with Division 1 requirements.
- B. Do not use harsh cleaning materials or methods that would damage finish.
- C. Remove manufacturer's proprietary labels and visible markings.

### 3.5 PROTECTION

- A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 081713



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## SECTION 081723 - INTEGRATED WOOD DOOR ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Integrated (pre-hung) swing wood door assemblies with hinges.
2. Shop priming wood door assemblies.
3. Factory fitting flush wood doors to frames and factory machining for hardware.
4. Door slabs for fire rated openings.

B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of door include details of edge construction, louvers, and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.

#### 1.3 DELIVERY, STORAGE, AND HANDLING

A. Store upright in a dry, well ventilated location at constant temperature. Do not store in damp, freshly plastered, drywall or concrete areas until materials have completely dried.

B. Store doors at least 10 feet away from any heat source to prevent uneven drying.

C. Doors must be sealed with an oil-based sealer or primer if stored for long periods.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by Masonite International Corporation or an approved substitution approved by Architect by one of the following:
1. Jeld-Wen Inc.
  2. Milliken Millwork, Inc.

## 2.2 INTEGRATED (PRE-HUNG) WOOD DOOR ASSEMBLIES.

- A. Interior Molded Wood Doors:
1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings with square sticking or a comparable substitution subject to approval by Architect.
  2. Faces: Smooth MDF or tempered hardboard, Class 2 per ANSI/AHA-A135.4, with minimum tensile strength of 90 PSI.
  3. Core: Manufacturer's standard hollow or solid core as indicated on Drawings.
  4. Thickness: As indicated on Drawings.
  5. Finish: Factory primed.
  6. Design: As indicated on Drawings
- B. Frame: Select soft wood fabricated as a flat jamb with doorstop applied or 2-piece split jamb.
1. Jamb Species: Finger-Jointed pine.
  2. Jamb Width: As required to fit wall depth.
  3. Hinge Jamb Preparations: Machined for standard weight radius mortise 3-1/2-inch hinges.
  4. Strike Jamb Preparations: Machined for full lip cylindrical strike plate.
  5. Double Door Unit Jamb Preparations: Machine for ball catch located at the top of door on both door panels designed to strike into the head jamb.
- C. Swinging Door Hardware:
1. Hinges:
    - a. Doors 7-feet or Smaller: Three standard weight radius mortise hinges.
    - b. Doors Greater than 7-feet : Four standard weight radius mortise hinges. Provide ball bearing hinges for solid core doors.
    - c. Finishes: Match finish of lockset/latchset as specified in Section 087100 "Door Hardware."
- D. Double Door Unit Jamb Preparations: Machine for ball catch located at the top of door on both door panels designed to strike into the head jamb.

**2.3 FABRICATION**

- A. Factory fit doors to frames. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 1. Comply with NFPA 80 requirements for fire-rated doors.

**2.4 SHOP PRIMING**

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer compatible with primer specified in Section 099100 "Painting."

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Inspect door prior to installation.
- B. Inspect rough opening for compliance with door manufacturer recommendations. Verify rough opening conditions are within recommended tolerances.

**3.2 PREPARATION**

- A. Prepare door for installation in accordance with manufacturer's recommendations.
- B. Trim bottom of jamb sides to achieve desired distance between door bottom and finished floor height.

**3.3 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.
- C. Place door unit into opening and level hinge side of jamb. Use shims fastened through jamb and stop to level and temporarily secure in place.
- D. Level latch side of jamb. Use shims fastened through jamb and stop to level and temporarily secure in place.
- E. Verify spacing between jamb and door is uniform on all sides. Adjust as necessary.
- F. Shim top of jamb in center of opening and fasten with nail.
- G. Re-check for square, level and even spacing around door. Nail securely in place through stop, jamb, shims and into studs every 12 inches .

- H. Set nails.
- I. Install trim on both sides using nails every 12 to 16 inches .

END OF SECTION 081723

## SECTION 083113 - ACCESS DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Access doors and frames for walls and ceilings.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Product Schedule: For access doors and frames.
- A. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

#### 1.3 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

#### 2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide the products by Acudor Products, Inc. specified in Part 2 or a comparable substitution approved by Architect by one of the following:
  - 1. Cesco Products.
  - 2. J. L. Industries, Inc.

3. Karp Associates, Inc.
4. Larsen's Manufacturing Company.
5. Milcor Limited Partnership.
6. Nystrom Building Products Co.
7. Williams Bros. Corporation of America (The)

B. Flush Access Doors and Frames:

1. Exposed Trim Type:
  - a. Basis-of-Design Product: Acudor Products, Inc.; UF-5000
  - b. Door (Up to 16 inches by 16 inches): Minimum 16 gage, 0.060-inch-thick sheet metal, set flush with exposed face flange of frame.
  - c. Door (Over 16 inches by 16 inches): Minimum 14 gage, 0.075-inch-thick sheet metal, set flush with exposed face flange of frame.
  - d. Frame: Minimum 16 gage, 0.060-inch-thick sheet metal with 1-inch-to 1-1/4-inch-wide, surface-mounted trim.
  - e. Hinges: Continuous, concealed.
  - f. Latch: Cam latch operated by screwdriver.
  - g. Finish: Factory primed.
2. Fire-Rated Exposed Trim Type (Walls):
  - a. Basis-of-Design Product: Acudor Products, Inc.; FB-5060.
  - b. Fire-Resistance Rating: 2 hour maximum.
  - c. Door (Non-insulated): Minimum 16 gage, 0.060-inch-thick sheet metal, flush construction
  - d. Frame: Minimum 16 gage, 0.060-inch-thick sheet metal with 1-inch-wide, surface-mounted trim.
  - e. Hinges: Concealed.
  - f. Automatic Closer: Spring type.
  - g. Latch: Universal self-latching bolt, operated by flush key with interior release.
  - h. Finish: Factory primed.
3. Fire-Rated Exposed Trim Type (Ceilings):
  - a. Basis-of-Design Product: Acudor Products, Inc.; FB-5050.
  - b. Fire-Resistance Rating: 2 hour maximum.
  - c. Door (Insulated): Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 20 gage, 0.036 inch.
  - d. Frame: Minimum 16 gage, 0.060-inch-thick sheet metal with 1-inch-wide, surface-mounted trim.
  - e. Hinges: Concealed.
  - f. Automatic Closer: Spring type.
  - g. Latch: Universal self-latching bolt, operated by flush key with interior release.
  - h. Finish: Factory primed.
4. Trimless Type:
  - a. Basis-of-Design Product: Acudor Products, Inc.; DW-5040.

- b. Door: Minimum 20 gage, 0.036-inch-thick sheet metal, set flush with exposed face flange of frame, flanged on four sides.
  - c. Frame: Minimum 26 gage, 0.0179-inch-thick sheet metal drywall bead flange.
  - d. Hinges: Concealed.
  - e. Latch: Cam latch operated by screwdriver.
  - f. Finish: Factory primed.
- 5. Fire-Rated, Trimless Type (Walls):
  - a. Basis-of-Design Product: Acudor Products, Inc.; FB-5060-DW.
  - b. Fire-Resistance Rating: 2 hour maximum.
  - c. Door (Non-insulated): Minimum 16 gage, 0.060-inch-thick sheet metal, flush construction
  - d. Frame: Minimum 16 gage, 0.060-inch-thick sheet metal with drywall bead.
  - e. Hinges: Continuous piano.
  - f. Automatic Closer: Spring type.
  - g. Latch: Universal self-latching bolt, operated by flush key with interior release.
  - h. Finish: Factory primed.
- 6. Fire-Rated, Trimless Type (Ceilings):
  - a. Basis-of-Design Product: Acudor Products, Inc.; FW-5050-DW.
  - b. Fire-Resistance Rating: 2 hour maximum.
  - c. Door (Insulated): Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 20 gage, 0.036 inch.
  - d. Frame: Minimum 16 gage, 0.060-inch-thick sheet metal with drywall bead.
  - e. Hinges: Concealed.
  - f. Automatic Closer: Spring type.
  - g. Latch: Universal self-latching bolt, operated by flush key with interior release.
  - h. Finish: Factory primed.

## 2.3 MATERIALS

- A. 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.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- C. Frame Anchors: Same material as door face.

## 2.4 FABRICATION

- A. 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.
- B. 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.



- C. Sizes: As required for area to access.
- D. Latch and Lock Hardware:
  - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed and as recommended by access panel manufacturer for size of door.
  - 2. Keys (Fire-Rated Access Doors): Furnish two flush keys per lock.

## 2.5 FINISHES

- A. 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 INSTALLATION

- A. Install fire-rated access doors and frames in fire-rated walls.
- B. Comply with manufacturer's written instructions for installing access doors and frames.
- C. Adjust doors and hardware, after installation, for proper operation.

### 3.2 WALL AND CEILING ACCESS DOOR SCHEDULE

- A. Public Areas, Gypsum Board Walls: Flush trimless type.
- B. Apartment Units, Main Spaces: Flush trimless type.
- C. Ceramic Tile Walls: Flush, exposed trim type.
- D. Apartment Closets: Flush, exposed trim type.
- E. Mechanical Rooms, Storage Rooms, Closets: Flush, exposed trim type.

END OF SECTION 083113

## SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Exterior storefront framing.
2. Exterior manual-swing entrance doors and frames.

B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples: For each exposed finish required.

D. 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.

E. 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.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.

B. Product test reports.

#### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

**1.5 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.

**1.6 WARRANTY**

- A. **Special Warranty:** Manufacturer 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. **Warranty Period:** Two 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. **Warranty Period:** Five years from date of Substantial Completion.

**PART 2 - PRODUCTS****2.1 PERFORMANCE REQUIREMENTS**

- A. **Delegated Design:** If required by sizes indicated, engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design structural reinforcement for the 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.
- 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. 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: Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
  - 2. Entrance Doors: Maximum air leakage of 1.0 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 10 lbf/sq. ft..
- H. 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. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.
- I. 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.

## 2.2 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, provide a 4 1/2" thermally broken, center set, outside glazed system by one of the following manufacturers:
  - 1. EFCO, LLC
  - 2. Kawneer North America
  - 3. Oldcastle Building Envelope
  - 4. United States Aluminum.
  - 5. YKK America
- B. Single Source Responsibility: Provide storefront framing and entrance doors from the same manufacturer.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Glazing System: Retained mechanically with gaskets on four sides.
  - 2. Glazing Plane: Center.
  - 3. Finish: Class II anodic coating.
  - 4. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Sub-sill: Manufacturer's standard extruded aluminum, thermally broken sub-sill.
- D. Head Receptor: Manufacturer's standard extruded aluminum, thermally broken head receptor.
- E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- F. 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 (if required): 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 thermally broken entrance doors with insulated glazing for manual-swing operation.
  - 1. Basis-of Design Products: Subject to compliance with requirements provide a qualified product from one of the following manufacturers:
    - a. EFCO, LLC
    - b. Kawneer North America.
    - c. Oldcastle Building Envelope.
    - d. United States Aluminum.
    - e. YKK America.
  - 2. Door Construction: 2 inches 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.
  - 3. Door Design: Wide stile; 5-inch nominal width. Provide 10-inch bottom rail.
  - 4. Glazing Stops and Gaskets: Snap-on, extruded-aluminum stops and preformed gaskets.
  - 5. Glazing: 1-inch fully tempered insulated unit as specified in Section 088000 "Glazing."

## 2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: As specified in Section 087100 "Door Hardware" and on Drawings.
  - 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
  - 2. Opening-Force Requirements:
    - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion.
- B. Weather Stripping: Manufacturer's standard replaceable components.
- C. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- D. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

## 2.6 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.

## 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 interior.
  - 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. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.8 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, **AA-M12C22A32/A34, Class II, 0.010 mm** or thicker.
  - 1. Color: **Black**.

## PART 3 - EXECUTION

### 3.1 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 sub-sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
1. Provide 2 1/2 inch minimum vertical end dams on ends of sub-sill flashing.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Section 088000 "Glazing."
- F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. 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.

END OF SECTION 084113



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## SECTION 085413 - FIBERGLASS WINDOWS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes fiberglass-framed windows.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

#### 1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace fiberglass windows that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period:
    - a. Window: 10 years from date of Substantial Completion.
    - b. Glazing Units: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: WDMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
  1. Minimum Performance Class: LC.
  2. Minimum Performance Grade: PG40-AP (Awnings); PG40-FW (Fixed Picture)
- C. Thermal Transmittance (U-Value): 0.29 (Awning Units); 0.27 (Fixed Units)
- D. Solar Heat-Gain Coefficient (SHGC): 0.29 (Awning Units); 0.33 (Fixed Units)
- E. Energy Star Rating: required; rated for North Central (NC) zone as minimum

## 2.2 FIBERGLASS WINDOWS

- A. Basis of Design: Subject to compliance with requirements, provide Marvin "Essential" Series fiberglass windows or a comparable substitution as approved by Architect.
- B. Operating Types: As indicated on Drawings.
- C. Frames and Sashes: Pultruded fiberglass complying with AAMA/WDMA/CSA 101/I.S.2/A440 and with exposed exterior fiberglass surfaces finished with manufacturer's standard enamel coating complying with AAMA 613.
  1. Exterior Color: **Black**
  2. Interior Finish: **White**
- D. Insulating-Glass Units: ASTM E2190.
  1. Glass: ASTM C1036, Type 1, Class 1, q3.
    - a. Tint: Clear.
    - b. Kind: Fully tempered where indicated on Drawings.
  2. Lites: Two.
  3. Filling: Space between glass lites filled with **Argon**.
  4. Low-E Coating: Sputtered on second surface (**E2**).
- E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- F. Hardware, General: Provide manufacturer's standard corrosion-resistant hardware sized to accommodate sash weight and dimensions.
  1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- G. Hung Window Hardware:
  1. Counterbalancing Mechanism: AAMA 902.

2. Locks and Latches: Operated from the inside only.
  3. Tilt Hardware: Releasing tilt latch allows sash to pivot about horizontal axis.
- H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

## 2.3 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
1. Type and Location: Full, inside for awning sashes.
- B. Aluminum Frames: Complying with SMA 1004 or SMA 1201.
1. Finish for Screens: Baked-on organic coating in color selected by Architect from manufacturer's full range.
- C. Glass-Fiber Mesh Fabric: 18-by-14 or 18-by-16 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.
1. Mesh Color: Manufacturer's standard.

## 2.4 FABRICATION

- A. Fabricate fiberglass windows in sizes indicated. Include a complete system for installing and anchoring windows.
- B. Glaze fiberglass windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- D. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
- E. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085413

## SECTION 087100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware .
2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For electrified door hardware.

1. Include diagrams for power, signal, and control wiring.
2. Include details of interface of electrified door hardware and building safety and security systems.

C. Samples: For each exposed product in each finish specified.

D. Door hardware schedule.

E. Keying schedule.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

#### 1.5 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

1. Scheduling Responsibility: Preparation of door hardware and keying schedule.
  2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC) and an Electrified Hardware Consultant (EHC).

## 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
    - a. Exit Devices: Two years from date of Substantial Completion.
    - b. Manual Closers: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested in accordance with UL 1784 and installed in compliance with NFPA 105.
1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.
- C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "2010 ADA Standards for Accessible Design," ICC A117.1, and HUD's "Fair Housing Accessibility Guidelines".

**2.2 HINGES**

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

**2.3 SELF-CLOSING HINGES AND PIVOTS**

- A. Self-Closing Hinges and Pivots: BHMA A156.17.

**2.4 CENTER-HUNG AND OFFSET PIVOTS**

- A. Center-Hung and Offset Pivots: BHMA A156.4.

**2.5 MECHANICAL LOCKS AND LATCHES**

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
  - 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
  - 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
  - 3. Deadbolts: Minimum 1-inch bolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated.
- D. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
- E. Bored Locks: BHMA A156.2; Grade 1; Series 4000.
- F. Mortise Locks: BHMA A156.13; Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.

**2.6 ELECTRIC STRIKES**

- A. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame.

**2.7 ELECTROMAGNETIC LOCKS**

- A. Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to frame and armature plate attached to door; full-exterior or full-interior type, as required by application indicated.



**2.8 ELECTROMECHANICAL LOCKS**

- A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; with strike that suits frame.
  - 1. Type: Bored.

**2.9 SURFACE BOLTS**

- A. Surface Bolts: BHMA A156.16.

**2.10 MANUAL FLUSH BOLTS**

- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

**2.11 EXIT DEVICES AND AUXILIARY ITEMS**

- A. Exit Devices and Auxiliary Items: BHMA A156.3.

**2.12 LOCK CYLINDERS**

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.
- B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.

**2.13 KEYING**

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.

**2.14 OPERATING TRIM**

- A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.

**2.15 ACCESSORIES FOR PAIRS OF DOORS**

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.
- B. Astragals: BHMA A156.22.

## 2.16 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force. Provide "Delayed Action" closers where indicated

## 2.17 CLOSER HOLDER RELEASE DEVICES

- A. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by loss of power.

## 2.18 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.

## 2.19 OVERHEAD STOPS AND HOLDERS

- A. Overhead Stops and Holders: BHMA A156.8.

## 2.20 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
- B. Maximum Air Leakage: When tested in accordance with ASTM E283 with tested pressure differential of 0.3-inch wg, as follows:
  - 1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
  - 2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
  - 3. Gasketing on Double Doors: 0.50 cfm per ft. of door opening.

## 2.21 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

## 2.22 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

2.23 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  - 2. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's 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. Do not install surface-mounted items until finishes have been completed on substrates involved.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
  - 1. Replace construction cores with permanent cores as directed by Owner.
  - 2. Furnish permanent cores to Owner for installation.
- F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room. Verify location with Architect.
  - 1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.
- G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

- I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
  - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.2 ADJUSTING

- A. 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.

END OF SECTION 087100

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## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes:

1. Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - a. Doors and Sidelites (non-fire-rated).
  - b. Glazed entrances.
  - c. Storefront framing.
  - d. Mirrored glass.

#### 1.2 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- A. 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.
- B. Product Test Reports: For each type of glass product.
- C. Closeout Submittals:
  1. Warranties: Special warranties specified in this Section.

#### 1.3 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. Source Limitations for Glass: Obtain glass from single source from single manufacturer for each glass type.
- C. Safety Glazing Labeling: Where safety-glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

- D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

#### 1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

#### 1.5 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

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

- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

- 1. Warranty Period: Five years from date of Substantial Completion.

- C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

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

- D. Manufacturer's Special Warranty on Mirrored Glass: Manufacturer's standard form in which mirrored glass manufacturer agrees to replace mirrored glass units that deteriorate within specified warranty period. Deterioration of mirrors includes defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning mirrors contrary to mirror manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

- 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURER

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following unless otherwise specified in other Part 2 Articles:
1. AFG Industries, Inc.
  2. Guardian Industries Corp.
  3. Pilkington North America
  4. Vitro Architectural Glass (PPG Industries, Inc.)

### 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: Design glass, including comprehensive engineering analysis according to ICC's 2009 International Building Code by a qualified professional engineer, using the following design criteria:
1. Design Wind Pressures: As indicated on Drawings.
  2. Design glass to resist design wind pressure based on glass type factors for short-duration load.
  3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces

### 2.3 GLASS PRODUCTS, GENERAL

- A. Thickness: Provide glass lites in thicknesses as needed to comply with performance requirements indicated unless otherwise noted but no less than the following:
1. Minimum thickness for pre-glazed window units and field installed insulated glass units: 1/8 inch (3 mm).
  2. Minimum thickness for field-installed monolithic glass: 1/4 inch (6 mm).
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance



Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

1. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

## 2.4 MONOLITHIC GLAZING

- A. Float Glass: ASTM C 1036, Type I Quality-Q3.

1. **FG-1:** Clear Float Glass: Class 1 (clear).
2. **CG-1:** Coated Clear Low-E Annealed Float Glass: Class 1 (clear) glass lites with pyrolytic or sputtered on second surface.

## 2.5 INSULATING GLAZING

- A. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary seal and desiccant.
2. Spacer: Aluminum with mill or clear anodic finish.
3. Tempered Insulating Glass Units: Provide tempered glass for both lites. Glazing unit label to clearly identify safety tempering for inspection and/or symbol shall be etched onto each lite in lower corner

- B. Insulating-Glass Units

1. **IG-1:** Clear Solar Low-E Insulating Glass:
  - a. Basis-of-Design Product: Vitro Architectural Glass (formerly PPG Industries); Solarban 60
  - b. Overall Unit Thickness: 1 inch thick.
  - c. Interspace Content: Argon.
  - d. Outdoor Lite: CG-1, 1/4 inch thick.
    - 1) Low-E Coating: Sputtered on second surface (E2).
  - e. Indoor Lite: FG-1, 1/4 inch thick.
  - f. Visible Light Transmittance: 70 percent minimum.
  - g. Winter Nighttime U-Factor: 0.24 maximum.
  - h. Summer Daytime U-Factor: 0.27 maximum.
  - i. Solar Heat Gain Coefficient: 0.39 maximum.

## 2.6 MIRRORRED GLASS

- A. Clear Glass Mirrors: ASTM C 1503, Mirror Select Quality, 1/4 inch thick.

1. **MG-1: Annealed Mirror Glass**

- a. Glass Type: FG-1
- b. Mirrored Glass Edge Treatment: Rounded polished edge.
- c. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
- d. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.7 GLAZING GASKETS

- A. Dense Compression Gaskets: Manufacturer's standard molded or extruded gaskets complying with ASTM C864 for neoprene and EPDM and ASTM C1115 for silicone and thermoplastic polyolefin rubber of profile and hardness required to maintain watertight seal:
- B. Soft Compression Gaskets: Manufacturer's standard extruded or molded, closed-cell, integral-skinned gaskets complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal.

2.8 GLAZING SEALANTS

- A. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. 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.
- C. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Dow Corning Corporation; Dow Corning® 795 Silicone Building Sealant.
- b. GE Construction Sealants; Momentive Performance Materials Inc.; SilGlaze II SCS2800.
- c. Tremco Incorporated; Spectrem 2.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

## 2.10 MISCELLANEOUS MIRROR MATERIALS

- A. Edge Sealer: Coating compatible with glass coating and approved by mirrored glass manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- B. Extruded-Aluminum Bottom Trim: J-channels formed with a return deep enough to produce a glazing channel to accommodate mirrored glass units of thickness indicated and in lengths required to cover bottom edge of each mirrored glass unit in a single piece.
  - 1. Finish: Brushed Nickel.
- C. Mirror Top Clips: Plated steel, two per mirror.
  - 1. Finish: Brushed nickel.
- D. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- E. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated

## 2.11 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing glazing, 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 system.
3. Minimum required face or 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 will 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. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. 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.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
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.

- H. 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.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- 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.
- L. Gasket Glazing (Dry)
  - 1. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
  - 2. 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.
  - 3. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
  - 4. Install gaskets so they protrude past face of glazing stops.

### 3.4 MIRROR INSTALLATION:

- A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.
- B. Provide space for air circulation between back of mirrored glass units and face of mounting surface.
- C. Mastic Spot Installation System: Install mirrored glass units with mastic as follows:
  - 1. Apply barrier coat to mirrored glass backing where approved in writing by manufacturers of mirrored glass and backing material.
  - 2. Apply mastic in spots to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrored glass units and face of mounting surface.
  - 3. After mastic is applied, align mirrored glass units and press into place while maintaining a minimum air space of 1/8 inch between back of mirrored glass and mounting surface.
- D. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.
  - 1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.

2. For continuous bottom supports, provide setting blocks 1/8 inch thick by 4 inches long at quarter points. For channels or other continuous supports in which water could be trapped, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long.
3. Where indicated, install bottom and top trim. Fabricate trim in single lengths to fit and cover top and bottom edges of mirrored glass units.

### 3.5 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 088000

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SECTION 088813 - FIRE-RATED GLAZING **(NOT YET FULLY EDITED)**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection-rated glazing.

1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of glass and glazing product.
- B. Sample warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the NGA's Certified Glass Installer Program.

1.6 WARRANTY

"Manufacturer's Special Warranty for Laminated Glass" and "Manufacturer's Special Warranty for Tempered Glazing Units with Clear Intumescent Interlayer" paragraphs below are examples only.

- A. 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.



Verify available warranties and warranty periods with manufacturers listed in Part 2 articles. Revise "Warranty Period" Subparagraph below if glass manufacturers insist on warranty beginning on date of manufacture. See the Evaluations.

1. Warranty Period: [Five] [10] <Insert number> years from date of Substantial Completion.

- B. Manufacturer's Special Warranty for Tempered Glazing Units with Clear Intumescent Interlayer: Manufacturer agrees to replace units that deteriorate within specified warranty period. Deterioration of tempered glazing units with clear intumescent interlayer is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning glass contrary to manufacturer's written instructions. Evidence of failure is air bubbles within units, or obstruction of vision by contamination or deterioration of intumescent interlayer.

Verify available warranties and warranty periods with manufacturers listed in Part 2 articles. Revise "Warranty Period" Subparagraph below if glass manufacturers insist on warranty beginning on date of manufacture. See the Evaluations.

1. Warranty Period: [Five] [10] <Insert number> years from date of Substantial Completion.

## PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

### 2.1 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

Retain "NGA Publications" Subparagraph below if applicable to glass products specified.

1. NGA Publications: ["Laminated Glazing Reference Manual" and ]"Glazing Manual."

Retain "Safety Glazing Labeling" Paragraph below if applicable and if labeling is required. Not all manufacturers participate in third-party testing programs.

- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of [the SGCC] [the SGCC or another certification agency acceptable to

**authorities having jurisdiction**] [or] **manufacturer**]. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

## 2.2 GLASS PRODUCTS

Retain paragraphs in this article that apply to glass types specified.

- A. Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Low-Iron Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.
- C. Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise 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. Laminated Glass: ASTM C1172. 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 unless fire-protection or fire-resistance rating is based on another product.
  - 2. Interlayer Thickness: Provide thickness as needed to comply with requirements.
  - 3. Interlayer Color: Clear unless otherwise indicated.

## 2.3 FIRE-PROTECTION-RATED GLAZING

Fire-protection-rated glazing is tested for use in a fire door assembly or fire window and is limited to such use. If used in door openings of 60, 90, or 180 minutes, maximum size is limited to 100 sq. in. (0.65 sq. m).

- A. General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing in accordance with NFPA 257 or UL 9, including hose-stream test, and shall comply with NFPA 80.
  - 1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from hose-stream test.

Retain "Fire-Protection-Rated Glazing Labeling" Paragraph below if applicable and if labeling is required. Below is based on the IBC. Note that no fire-protection-rated glazing product can meet the 450 deg F (250 deg C) above ambient after 30 minutes of fire exposure.

- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether glazing has passed hose-stream test; whether glazing meets 450 deg F (250 deg C) temperature-rise limitation; and fire-resistance rating in minutes.

Product in "Fire-Protection-Rated Tempered Glass" Paragraph below is available for 20-minute fire-protection rating. It does not pass hose-stream test contained in NFPA 252 and NFPA 257. However, the IBC exempts hose-stream test for 20-minute fire-protection-rated door assemblies, but it does require it for glazing material in transoms and sidelites.

- C. Fire-Protection-Rated Tempered Glass: 6-mm thickness; fire-protection-rated tempered glass; complying with 16 CFR 1201, Category II.

- 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Product in "Fire-Protection-Rated Monolithic Glass for Doors and Protected Openings" Paragraph below is available in 45-minute fire-protection rating for doors, windows, sidelights, and transoms, with hose-stream testing.

- D. Fire-Protection-Rated Monolithic Glass for Doors and Protected Openings: 19-mm thickness; low-iron fire-protection-rated glass; complying with 16 CFR 1201, Category II. UL listed and tested in accordance with NFPA 252 for fire-rated doors and NFPA 257 for protected openings with hose-stream testing.

- 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Product in "Fire-Protection-Rated Monolithic Glass for Doors Only" Paragraph below is available in 45-, 60-, and 90-minute fire-protection rating with hose-stream testing, up to 100 sq. in. (0.065 sq. m) in doors only.

- E. Fire-Protection-Rated Monolithic Glass for Doors Only: 19-mm thickness; clear, fire-protection glass; complying with 16 CFR 1201, Category II. UL listed and tested in accordance with NFPA 252 for fire-rated doors with hose-stream testing.

- 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Product in "Fire-Protection-Rated Film-Faced Ceramic Glazing" Paragraph below is available for 20-, 45-, 60-, 90-, 120-, and 180-minute fire-protection rating, but it has a 450 deg F (250 deg C) temperature-rise limitation in door openings of 60, 90, and 180 minutes with a maximum size of 100 sq. in. (0.065 sq. m). Product is unusable in exterior applications for 60 minutes or greater.

- F. Fire-Protection-Rated Film-Faced Ceramic Glazing: [Clear] [Warm tint], ceramic flat glass; 5-mm thickness; faced on one surface with a clear glazing film; complying with 16 CFR 1201, Category II.

- 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Product in "Fire-Protection-Rated Laminated Ceramic Glazing" Paragraph below is available for 20-, 45-, 60-, 90-, 120-, and 180-minute fire-protection rating, but it has a 450 deg F (250 deg C) temperature-rise limitation in door openings of 60, 90, and 180 minutes with a maximum size of 100 sq. in. (0.065 sq. m). Product is unusable in exterior applications for 60 minutes or greater.

- G. Fire-Protection-Rated Laminated Ceramic Glazing: Laminated glass made from two plies of [clear] [warm tint], ceramic glass; 8-mm total thickness; complying with 16 CFR 1201, Category II.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Product in "Fire-Protection-Rated Laminated Glass with Intumescent Interlayer" Paragraph below is available for 45-, 60-, 90-, and 120-minute fire-protection rating.

- H. Fire-Protection-Rated Laminated Glass with Intumescent Interlayer: Laminated glass made from multiple plies of uncoated, [clear] [low-iron] float glass; with intumescent interlayers; complying with 16 CFR 1201, Category II.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Product in "Fire-Protection-Rated Tempered Glazing Units with Clear Intumescent Interlayer" Paragraph below is available for 20-, 45-, 60-, 90-, and 120-minute fire-protection rating.

- I. Fire-Protection-Rated Tempered Glazing Units with Clear Intumescent Interlayer: Double glazing units made from two or more lites of uncoated, fully tempered, [clear] [low-iron] float glass; with a perimeter edge seal enclosing a cavity filled with optically clear, semi-solid, intumescent polymer; complying with 16 CFR 1201, Category II.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

## 2.4 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
  1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  2. [<Double click to insert sustainable design text for sealants.>](#)
  3. Colors of Exposed Glazing Sealants: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range of industry colors].

## PART 3 - EXECUTION

### 3.1 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. 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.

- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. 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.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

### 3.2 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 contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.

END OF SECTION 088813

SECTION 089119 - FIXED LOUVERS **(NOT YET FULLY EDITED)**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fixed [~~extruded-aluminum~~] [~~and~~] [~~formed-metal~~] louvers.
- B. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

- 1. Section 081113 "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.
- 2. Section 081416 "Flush Wood Doors" for louvers in flush wood doors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.

1.3 QUALITY ASSURANCE

Delete "Welding Qualifications" Paragraph below if no welding is required or if weld strength is not critical.

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

1.4 WARRANTY

- A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.

Coordinate "Warranty Period" Subparagraph below with "Aluminum Finishes" Article. AAMA 2604 is intended to represent five years of performance; AAMA 2605 is intended to represent 10 years of performance. Verify available warranties and warranty periods for finishes.

1. Warranty Period: [Five] [10] [20] <Insert number> years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

Coordinate "Warranty Period" Subparagraph below with "Aluminum Finishes" Article. Five years is standard for Class I anodized finishes. Class II anodized finishes often carry less than a five-year warranty. Verify available warranties and warranty periods for finishes.

1. Warranty Period: [Five] [10] <Insert number> years from date of Substantial Completion.

## PART 2 - PRODUCTS

Manufacturers and products listed in this Section are neither recommended nor endorsed by the AIA or Deltek. Before selecting manufacturers and products, verify availability, suitability for intended applications, and compliance with minimum performance requirements. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

Product options commonly available from manufacturers are included in square brackets throughout the Section Text. Not every manufacturer listed can provide every option offered; verify availability with manufacturers. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers 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 are considered to act normal to the face of the building.
  1. Wind Loads:

Retain one of three subparagraphs below. If retaining first, indicate pressures on appropriate elevation Drawings. Requirements in second and third are examples only. Revise to suit Project. Consult a structural engineer to quantify design loads applicable to Project. Verify compliance with codes. See the Evaluations.

- a. Determine loads based on pressures as indicated on Drawings.
- b. Determine loads based on a uniform pressure of [20 lbf/sq. ft. (957 Pa)] [30 lbf/sq. ft. (1436 Pa)] <Insert value>, acting inward or outward.
- c. Determine loads based on pressures indicated below:

- 1) Corner Zone: Within **<Insert distance>** of building corners, uniform pressure of **<Insert design wind pressure>**, acting inward, and **<Insert design wind pressure>**, acting outward.
- 2) Other Than Corner Zone: Uniform pressure of **<Insert design wind pressure>**, acting inward, and **<Insert design wind pressure>**, acting outward.

## 2.2 FIXED EXTRUDED-ALUMINUM LOUVERS

Copy paragraphs below and re-edit for each product.

Insert drawing designation for each product required. Use these designations on Drawings to identify each product.

A. Horizontal Nondrainable-Blade Louver, Extruded Aluminum **<Insert drawing designation>**:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Requirements in "Louver Depth," "Blade Profile," and "Frame and Blade Nominal Thickness" subparagraphs below are based on products available from listed manufacturers. Revise to suit Project.

2. Louver Depth: [**2 inches (50 mm)**] [**4 inches (100 mm)**] [**6 inches (150 mm)**] **<Insert dimension>**.
3. Blade Profile: [**Plain blade without**] [**Blade with**] center baffle.

Insert descriptive requirements below that relate to appearance, such as blade spacing and angle, if required. If inserting such requirements, verify that louvers are available that comply with these requirements and with performance requirements selected.

4. Frame and Blade Nominal Thickness: Not less than [**0.080 inch (2.03 mm)**] [**0.060 inch (1.52 mm) for blades and 0.080 inch (2.03 mm) for frames**].
5. Mullion Type: [**Exposed**] [**Semirecessed**] [**Fully recessed**].
6. Louver Performance Ratings:

Requirements in "Free Area," "Point of Beginning Water Penetration," and "Air Performance" subparagraphs below are based on products available from listed manufacturers. If more than one choice is given for a requirement, the most lenient choice allows many products in the category to comply, resulting in competitive pricing; the most restrictive choice limits products to high-performance designs, potentially with higher costs.

- a. Free Area: Not less than [**7.5 sq. ft. (0.70 sq. m)**] [**8.0 sq. ft. (0.74 sq. m)**] [**8.5 sq. ft. (0.79 sq. m)**] **<Insert value>** for **48-inch-** (1220-mm-) wide by **48-inch-** (1220-mm-) high louver.
- b. Point of Beginning Water Penetration: Not less than [**700 fpm (3.6 m/s)**] [**750 fpm (3.8 m/s)**] [**800 fpm (4.1 m/s)**] [**850 fpm (4.3 m/s)**] [**900 fpm (4.6 m/s)**] [**950 fpm (4.8 m/s)**] **<Insert value>**.

Do not specify free-area velocity in "Air Performance" Subparagraph below that is greater than point of beginning water penetration specified in "Point of Beginning Water Penetration" Subparagraph above.

- c. Air Performance: Not more than [**0.10-inch wg (25-Pa)**] **<Insert value>** static pressure drop at [**650-fpm (3.3-m/s)**] [**700-fpm (3.6-m/s)**] [**750-fpm (3.8-m/s)**] **<Insert value>** free-area [**exhaust**] [**intake**] velocity.



Verify availability of seal in "AMCA Seal" Subparagraph below for louver sizes indicated. Delete if not required. Coordinate with product data submittal requirement.

7. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

B. Horizontal Drainable-Blade Louver, Extruded Aluminum <Insert drawing designation>:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Requirements in "Louver Depth" and "Frame and Blade Nominal Thickness" subparagraphs below are based on products available from listed manufacturers. Revise to suit Project.

2. Louver Depth: [**4 inches (100 mm)**] [**6 inches (150 mm)**] <Insert dimension>.

Insert descriptive requirements below that relate to appearance, such as blade spacing and angle, if required. If inserting such requirements, verify that louvers are available that comply with these requirements and with performance requirements selected.

3. Frame and Blade Nominal Thickness: Not less than [**0.080 inch (2.03 mm)**] [**0.060 inch (1.52 mm) for blades and 0.080 inch (2.03 mm) for frames**].
4. Mullion Type: Exposed.
5. Louver Performance Ratings:

Requirements in "Free Area," "Point of Beginning Water Penetration," and both "Air Performance" subparagraphs below are based on products available from listed manufacturers. If more than one choice is given for a requirement, the most lenient choice allows many products in the category to comply, resulting in competitive pricing; the most restrictive choice limits products to high-performance designs, potentially with higher costs.

- a. Free Area: Not less than [**7.0 sq. ft. (0.65 sq. m)**] [**7.5 sq. ft. (0.70 sq. m)**] [**8.0 sq. ft. (0.74 sq. m)**] [**8.5 sq. ft. (0.79 sq. m)**] <Insert value> for **48-inch-** (1220-mm-) wide by **48-inch-** (1220-mm-) high louver.

In "Point of Beginning Water Penetration" Subparagraph below, usually retain 900 to 1050 fpm (4.6 to 5.3 m/s) for 4-inch (100-mm) louvers and 950 to 1100 fpm (4.8 to 5.6 m/s) for 6-inch (150-mm) louvers.

- b. Point of Beginning Water Penetration: Not less than [**900 fpm (4.6 m/s)**] [**950 fpm (4.8 m/s)**] [**1000 fpm (5.1 m/s)**] [**1050 fpm (5.3 m/s)**] [**1100 fpm (5.6 m/s)**] <Insert value>.
- c. Air Performance:

Retain one of two subparagraphs below. If retaining first, usually retain 700 to 800 fpm (3.6 to 4.1 m/s) for 4-inch (100-mm) louvers and 750 to 850 fpm (3.8 to 4.3 m/s) for 6-inch (150-mm) louvers. Do not specify free-area velocity in either subparagraph that is greater than point of beginning water penetration specified in "Point of Beginning Water Penetration" Subparagraph above.

- 1) Not more than [**0.10-inch wg (25-Pa)**] <Insert value> static pressure drop at [**700-fpm (3.6-m/s)**] [**750-fpm (3.8-m/s)**] [**800-fpm (4.1-m/s)**] [**850-fpm (4.3-m/s)**] <Insert value> free-area [exhaust] [intake] velocity.
- 2) Not more than [**0.15-inch wg (37-Pa)**] <Insert value> static pressure drop at [**900-fpm (4.6-m/s)**] [**950-fpm (4.8-m/s)**] [**1000-fpm (5.1-m/s)**] <Insert value> free-area [exhaust] [intake] velocity.

Verify availability of seal in "AMCA Seal" Subparagraph below for louver sizes indicated. Delete if not required. Coordinate with product data submittal requirement.

6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

"Horizontal, Continuous-Line, Drainable-Blade Louver, Extruded Aluminum" Paragraph below is for specifying drainable-blade louvers that require vertical mullions, due to louver width, but where a continuous horizontal appearance without visible mullions is needed.

- C. Horizontal, Continuous-Line, Drainable-Blade Louver, Extruded Aluminum <Insert drawing designation>: Drainable-blade louver with blade gutters (drains) in rear two-thirds of blades only.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Requirements in "Louver Depth" and "Frame and Blade Nominal Thickness" subparagraphs below are based on products available from listed manufacturers. Revise to suit Project.

2. Louver Depth: [6 inches (150 mm)] <Insert dimension>.

Insert descriptive requirements below that relate to appearance, such as blade spacing and angle, if required. If inserting such requirements, verify that louvers are available that comply with these requirements and with performance requirements selected.

3. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
4. Mullion Type: Semirecessed.
5. Louver Performance Ratings:
  - a. Free Area: Not less than [7.8 sq. ft. (0.72 sq. m)] <Insert value> for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
  - b. Point of Beginning Water Penetration: Not less than [850 fpm (4.3 m/s)] <Insert value>.
  - c. Air Performance: Not more than [0.10-inch wg (25-Pa)] <Insert value> static pressure drop at [800-fpm (4.1-m/s)] <Insert value> free-area [exhaust] [intake] velocity.

Verify availability of seal in "AMCA Seal" Subparagraph below for louver sizes indicated. Delete if not required. Coordinate with product data submittal requirement.

6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

- D. Horizontal, Wind-Driven-Rain-Resistant Louver, Extruded Aluminum <Insert drawing designation>:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Requirements in "Louver Depth" and "Frame and Blade Nominal Thickness" subparagraphs below are based on products available from listed manufacturers. Revise to suit Project.

2. Louver Depth: [4 inches (100 mm)] [5 inches (125 mm)] [7 inches (175 mm)] [8 inches (200 mm)] [9 inches (225 mm)] <Insert dimension>.

Usually retain second option in "Frame and Blade Nominal Thickness" Subparagraph below; blades of wind-driven-rain-resistant louvers gain stiffness from their complex shapes and, therefore, do not need to

be as thick as blades of some other louver types. If retaining first option, verify availability of louvers with performance requirements selected.

3. Frame and Blade Nominal Thickness: Not less than **[0.080 inch (2.03 mm)] [0.060 inch (1.52 mm) for blades and 0.080 inch (2.03 mm) for frames]**.
4. Louver Performance Ratings:

Requirements in "Free Area" and "Air Performance" subparagraphs below are based on products available from listed manufacturers. If more than one choice is given for a requirement, the most lenient choice allows many products in the category to comply, resulting in competitive pricing; the most restrictive choice limits products to high-performance designs, potentially with higher costs.

- a. Free Area: Not less than **[5.0 sq. ft. (0.46 sq. m)] [6.0 sq. ft. (0.56 sq. m)] [7.0 sq. ft. (0.65 sq. m)]** <Insert value> for **48-inch-** (1220-mm-) wide by **48-inch-** (1220-mm-) high louver.
- b. Air Performance: Not more than **[0.10-inch wg (25-Pa)]** <Insert value> static pressure drop at **[600-fpm (3.0-m/s)] [700-fpm (3.6-m/s)] [800-fpm (4.1-m/s)]** <Insert value> free-area **[exhaust] [intake]** velocity.
- c. Wind-Driven Rain Performance: Not less than **[99] [95] [80]** <Insert number> percent effectiveness when subjected to a rainfall rate of **[3 inches (75 mm) per hour and a wind speed of 29 mph (13 m/s)] [8 inches (200 mm) per hour and a wind speed of 50 mph (22.4 m/s)]** at a core-area intake velocity of **[300 fpm (1.5 m/s)] [400 fpm (2.0 m/s)] [500 fpm (2.5 m/s)]** <Insert value>.

Verify availability of seal in "AMCA Seal" Subparagraph below for louver sizes indicated. Delete if not required. Coordinate with product data submittal requirement.

5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

## 2.3 FIXED FORMED-METAL LOUVERS

Copy paragraphs below and re-edit for each product.

Insert drawing designation for each product required. Use these designations on Drawings to identify each product.

- A. Horizontal Nondrainable-Blade Louver, Formed Metal <Insert drawing designation>:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Requirements in "Louver Depth," "Blade Profile," and both "Frame and Blade Material and Nominal Thickness" subparagraphs below are based on products available from listed manufacturers. Revise to suit Project.

2. Louver Depth: **[4 inches (100 mm)] [6 inches (150 mm)]** <Insert dimension>.
3. Blade Profile: **[Plain blade without] [Blade with]** center baffle.

Insert descriptive requirements below that relate to appearance, such as blade spacing and angle, if required. If inserting such requirements, verify that louvers are available that comply with these requirements and with performance requirements selected.

4. Frame and Blade Material and Nominal Thickness:

- a. Galvanized-steel sheet, not less than **[0.052 inch (1.32 mm) for frames and 0.040 inch (1.02 mm) for blades]** **[0.052 inch (1.32 mm)] [0.064 inch (1.63 mm)]**.
  - b. Stainless steel sheet, not less than **[0.050 inch (1.27 mm)] [0.062 inch (1.59 mm)]**.
- 5. Mullion Type: **[Exposed] [Semirecessed] [Fully recessed]**.
  - 6. Louver Performance Ratings:

Requirements in "Free Area," "Point of Beginning Water Penetration," and "Air Performance" subparagraphs below are based on products available from listed manufacturers. If more than one choice is given for a requirement, the most lenient choice allows many products in the category to comply, resulting in competitive pricing; the most restrictive choice limits products to high-performance designs, potentially with higher costs.

- a. Free Area: Not less than **[6.5 sq. ft. (0.60 sq. m)] [7.0 sq. ft. (0.65 sq. m)] [7.5 sq. ft. (0.70 sq. m)] [8.0 sq. ft. (0.74 sq. m)]** **<Insert value>** for **48-inch-** (1220-mm-) wide by **48-inch-** (1220-mm-) high louver.
- b. Point of Beginning Water Penetration: Not less than **[550 fpm (2.8 m/s)] [600 fpm (3.0 m/s)] [650 fpm (3.3 m/s)] [700 fpm (3.6 m/s)]** **<Insert value>**.

Do not specify free-area velocity in "Air Performance" Subparagraph below that is greater than point of beginning water penetration specified in "Point of Beginning Water Penetration" Subparagraph above.

- c. Air Performance: Not more than **[0.10-inch wg (25-Pa)]** **<Insert value>** static pressure drop at **[550-fpm (2.8-m/s)] [600-fpm (3.0-m/s)] [650-fpm (3.3-m/s)] [700-fpm (3.6-m/s)]** **<Insert value>** free-area **[exhaust] [intake]** velocity.

Verify availability of seal in "AMCA Seal" Subparagraph below for louver sizes indicated. Delete if not required. Coordinate with product data submittal requirement.

- 7. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
- B. Horizontal Drainable-Blade Louver, Formed Metal **<Insert drawing designation>**:
    - 1. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**

Requirements in "Louver Depth," "Blade Profile," and both "Frame and Blade Material and Nominal Thickness" subparagraphs below are based on products available from listed manufacturers. Revise to suit Project.

- 2. Louver Depth: **[4 inches (100 mm)] [6 inches (150 mm)]** **<Insert dimension>**.

Insert descriptive requirements below that relate to appearance, such as blade spacing and angle, if required. If inserting such requirements, verify that louvers are available that comply with these requirements and with performance requirements selected.

- 3. Frame and Blade Material and Nominal Thickness:
  - a. Galvanized-steel sheet, not less than **[0.052 inch (1.32 mm) for frames and 0.040 inch (1.02 mm) for blades]** **[0.052 inch (1.32 mm)] [0.064 inch (1.63 mm)]**.
  - b. Stainless steel sheet, not less than **[0.050 inch (1.27 mm)] [0.062 inch (1.59 mm)]**.
- 4. Mullion Type: Exposed.
- 5. Louver Performance Ratings:

Requirements in "Free Area," "Point of Beginning Water Penetration," and both "Air Performance" subparagraphs below are based on products available from listed manufacturers. If more than one choice is given for a requirement, the most lenient choice allows many products in the category to comply, resulting in competitive pricing; the most restrictive choice limits products to high-performance designs, potentially with higher costs.

- a. Free Area: Not less than **[7.0 sq. ft. (0.65 sq. m)] [7.5 sq. ft. (0.70 sq. m)] [8.0 sq. ft. (0.74 sq. m)] [8.5 sq. ft. (0.79 sq. m)]** <Insert value> for **48-inch-** (1220-mm-) wide by **48-inch-** (1220-mm-) high louver.
- b. Point of Beginning Water Penetration: Not less than **[800 fpm (4.1 m/s)] [850 fpm (4.3 m/s)] [900 fpm (4.6 m/s)] [950 fpm (4.8 m/s)] [1000 fpm (5.1 m/s)]** <Insert value>.
- c. Air Performance:

Retain one of two subparagraphs below. Do not specify free-area velocity in either subparagraph that is greater than point of beginning water penetration specified in "Point of Beginning Water Penetration" Subparagraph above.

- 1) Not more than **[0.10-inch wg (25-Pa)]** <Insert value> static pressure drop at **[700-fpm (3.6-m/s)] [750-fpm (3.8-m/s)] [800-fpm (4.1-m/s)] [850-fpm (4.3-m/s)]** <Insert value> free-area [exhaust] [intake] velocity.
- 2) Not more than **[0.15-inch wg (37-Pa)]** <Insert value> static pressure drop at **[900-fpm (4.6-m/s)] [950-fpm (4.8-m/s)] [1000-fpm (5.1-m/s)]** <Insert value> free-area velocity.

Verify availability of seal in "AMCA Seal" Subparagraph below for louver sizes indicated. Delete if not required. Coordinate with product data submittal requirement.

6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

## 2.4 LOUVER SCREENS

Retain one of two options in "General" Paragraph below. If retaining second option, indicate locations on Drawings.

- A. General: Provide screen at **[each exterior louver] [louvers indicated]**.

Retain applicable requirements in "Screen Location for Fixed Louvers" and "Screening Type" subparagraphs below to suit louver locations, types, and functions. See the Evaluations.

1. Screen Location for Fixed Louvers: Interior face.

Retain one of three options in "Screening Type" Subparagraph below. The International Mechanical Code requires that openings in louvers or screens for exhaust openings or intake openings in residential occupancies be 1/4 to 1/2 inch (6 to 13 mm); for intake openings in nonresidential occupancies, 1/4 to 1 inch (6 to 25 mm).

2. Screening Type: **[Bird screening] [Bird screening, except where insect screening is indicated] [Insect screening]**.

- B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.

Retain "Louver Screening for Aluminum Louvers," "Louver Screening for Galvanized-Steel Louvers," or "Louver Screening for Stainless Steel Louvers" Paragraph below for louver material selected. If more than one screen type is required, coordinate selection with Drawings and with mechanical engineer for required percentage of open area. Delete all three if manufacturer's standard screening is acceptable.

- C. Louver Screening for Aluminum Louvers:

Retain one or more of five subparagraphs below, or insert another mesh or wire size. If both bird and insect screening are required, indicate location of each on Drawings.

1. Bird Screening, Aluminum: 1/2-inch- (13-mm-) square mesh, 0.063-inch (1.60-mm) wire.
2. Bird Screening, Stainless Steel: 1/2-inch- (13-mm-) square mesh, 0.047-inch (1.19-mm) wire.
3. Bird Screening, Flattened, Expanded Aluminum: 3/4 by 0.050 inch (19 by 1.27 mm) thick.
4. Insect Screening, Aluminum: 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm) wire.
5. Insect Screening, Stainless Steel: 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.

- D. Louver Screening for Galvanized-Steel Louvers:

Retain one or more of four subparagraphs below, or insert another mesh or wire size. If both bird and insect screening are required, indicate location of each on Drawings.

1. Bird Screening, Galvanized Steel: 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire.
2. Bird Screening, Stainless Steel: 1/2-inch- (13-mm-) square mesh, 0.047-inch (1.19-mm) wire.
3. Insect Screening, Galvanized Steel: 18-by-14 (1.4-by-1.8-mm) mesh, 0.011-inch (0.28-mm) wire.
4. Insect Screening, Stainless Steel: 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.

- E. Louver Screening for Stainless Steel Louvers:

Retain one of or both subparagraphs below, or insert another mesh or wire size. If both bird and insect screening are required, indicate location of each on Drawings.

1. Bird Screening, Stainless Steel: 1/2-inch- (13-mm-) square mesh, 0.047-inch (1.19-mm) wire.
2. Insect Screening, Stainless Steel: 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.

Insert other screening materials as required, including bronze and glass fiber.

## 2.5 MATERIALS

- A. Aluminum Extrusions: **ASTM B221 (ASTM B221M)**, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: **ASTM B209 (ASTM B209M)**, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Galvanized-Steel Sheet: ASTM A653/A653M, [**G60 (Z180)**] [**G90 (Z275)**] zinc coating, mill phosphatized.
- D. Stainless Steel Sheet: ASTM A240/A240M, 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.

First option in first subparagraph below specifies flush heads; second option specifies raised heads.

- 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 E488/E488M conducted by a qualified testing agency.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

## 2.6 FABRICATION

- A. 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.
- B. 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

Retain finishes in paragraphs below to suit Project. If retaining more than one, indicate location of each on Drawings or by inserts.

Retain one of two options in "Clear Anodic Finish" Paragraph below. Class II finish is standard with many manufacturers; Class I finish is heavy anodized. Verify availability with manufacturers.

- A. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] [AA-M12C22A31, Class II, 0.010 mm] or thicker.

Retain one of two options in "Color Anodic Finish" Paragraph below. Verify availability with manufacturers.

- B. Color Anodic Finish: AAMA 611, [AA-M12C22A42/A44, Class I, 0.018 mm] [AA-M12C22A32/A34, Class II, 0.010 mm] or thicker.
  - 1. Color: [Champagne] [Light bronze] [Medium bronze] [Dark bronze] [Black] [Match Architect's sample] [As selected by Architect from full range of industry colors and color densities] <Insert color>.

Retain "High-Performance Organic Finish, Two-Coat PVDF," "Superior-Performance Organic Finish, Three-Coat PVDF," "Superior-Performance Organic Finish, Four-Coat PVDF," "Superior-Performance Organic Finish, Single-Coat FEVE," or "Superior-Performance Organic Finish, Two-Coat FEVE" Paragraph below; if more than one finish is required, indicate location of each system on Drawings, in schedules, or by inserts. Coordinate finish system selected with special finish warranty period specified in Part 1 "Warranty" Article.

In "High-Performance Organic Finish, Two-Coat PVDF" Paragraph below, retain AAMA 2604 with 50 percent resin content by weight in color coat or AAMA 2605 with 70 percent resin content by weight in color coat for high-performance organic coatings on extrusions and panels. If specific products are required, name coating manufacturers and products.

- C. High-Performance Organic Finish, Two-Coat PVDF: Fluoropolymer finish complying with [AAMA 2604] [AAMA 2605] and containing not less than [50] [70] percent PVDF resin by weight in color coat.
  - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [for seacoast and severe environments].
  - 2. Color and Gloss: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.
- D. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
  - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [for seacoast and severe environments].



2. Color and Gloss: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.**
- E. Superior-Performance Organic Finish, Four-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions **[for seacoast and severe environments]**.
  2. Color and Gloss: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.**

"Superior-Performance Organic Finish, Single-Coat FEVE" Paragraph below is not suitable for seacoast and severe environments.

- F. Superior-Performance Organic Finish, Single-Coat FEVE: Fluoropolymer finish complying with AAMA 2605.
1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  2. Color and Gloss: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.**
- G. Superior-Performance Organic Finish, Two-Coat FEVE: Fluoropolymer finish complying with AAMA 2605.
1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
  2. Color and Gloss: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.**

## 2.8 GALVANIZED-STEEL SHEET FINISHES

Some louvers are made from coil-coated metal sheet and are touched up after assembly. Finishing galvanized steel after fabrication provides better corrosion protection. Usually retain "Finish louvers after assembly" Paragraph below unless cost is primary consideration.

- A. Finish louvers after assembly.
- B. Surface Preparation: Clean surfaces with nonpetroleum solvent, so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair according to ASTM A780/A780M.

- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of **2 mils (0.05 mm)**.
- 1. Color and Gloss: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and gloss>.**

For exact finish, insert names of coating manufacturers and products.

## 2.9 STAINLESS STEEL SHEET FINISHES

Delete this article if not using stainless steel, formed-metal louvers.

- A. Repair sheet finish by grinding and polishing irregularities, weld spatter, scratches, and forming marks to match surrounding finish.

## PART 3 - EXECUTION

### 3.1 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. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. 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.

### 3.2 ADJUSTING

- A. 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.

END OF SECTION 089119

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## SECTION 089516 - WALL VENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes wall vents.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of metal finish required.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Research reports.
- B. Sample warranties.

#### 1.4 WARRANTY

- A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 WALL VENTS (BRICK VENTS)

- A. Extruded-Aluminum Wall Vents:
  - 1. Extruded-aluminum louvers and frames, not less than **0.125-inch (3.18-mm)** nominal thickness, assembled by welding; with **18-by-14- (1.4-by-1.8-mm-)** mesh, aluminum insect screening on inside face.
  - 2. Dampers: Aluminum blades and frames mounted on inside of wall vents.

3. Finish: Manufacturer standard factory paint finish. Color as selected from manufacturer's full range.
- B. Cast-Aluminum Wall Vents:
  1. One-piece, cast-aluminum louvers and frames; with ~~18-by-14-~~ (1.4-by-1.8-mm-) mesh, aluminum insect screening on inside face.
  2. Dampers: Aluminum blades and frames mounted on inside of wall vents.
  3. Finish: Mill.

## 2.2 MATERIALS

- A. Aluminum Extrusions: ~~ASTM B221~~ (ASTM B221M), Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ~~ASTM B209~~ (ASTM B209M), Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Aluminum Castings: ASTM B26/B26M, Alloy 319.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Protect unpainted surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.
- B. Build vents into masonry work as construction progresses; comply with requirements in Section 042000 "Unit Masonry."

END OF SECTION 089516

## SECTION 092116 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Gypsum board shaft wall assemblies.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.

### 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 E119 by an independent testing agency.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E90 and classified according to ASTM E413 by a testing and inspecting agency.

#### 2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: As indicated on Drawings.
- B. STC Rating: 51, minimum.
- C. Gypsum Shaftliner Board:
  - 1. Type X: ASTM C1396/C1396M; manufacturer's proprietary fire-resistive liner panels with paper faces, 1 inch thick, with double beveled long edges.
  - 2. Moisture- and Mold-Resistant Type X: ASTM C1396/C1396M; manufacturer's proprietary fire-resistive liner panels with ASTM D3273 mold-resistance score of 10 as rated according to ASTM D3274, 1 inch thick, and with double beveled long edges.

- D. Non-Load-Bearing Steel Framing, General: Complying with ASTM C645 requirements for metal unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.
- E. Studs: Manufacturer's standard profile for repetitive, corner, and end members as follows:
  - 1. Depth: As indicated on Drawings.
  - 2. Minimum Base-Metal Thickness: 0.030 inch.
- F. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.
  - 1. Minimum Base-Metal Thickness: Matching steel studs.
- G. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the 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.
- H. Finish Panels: Gypsum board as specified in Section 092900 "Gypsum Board."
- I. Sound Attenuation Blankets: As specified in Section 092900 "Gypsum Board."

## 2.3 AUXILIARY MATERIALS

- A. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
- C. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
- D. Reinforcing: Galvanized-steel reinforcing strips with 0.033-inch minimum thickness of base metal (uncoated).

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

- C. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged.
- D. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.
- E. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.
  - 1. Reinforcing: Provide where items attach directly to shaft wall assembly as indicated on Drawings; accurately position and secure behind at least one layer of face panel.
- F. Penetrations: Install supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.
- G. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.
- H. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- I. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
- J. 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.
- K. Remove and replace panels that are wet, moisture damaged, or mold damaged.

END OF SECTION 092116



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## SECTION 092216 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Non-load-bearing steel framing systems for interior partitions.
  - 2. Suspension systems for interior ceilings and soffits.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

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

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation reports for post-installed anchors and power-actuated fasteners.

### 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 E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

#### 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with AISI S220 and ASTM C645, Section 10 for conditions indicated.
  - 1. Steel Sheet Components: Comply with AISI S220 and ASTM C645, Section 10 requirements for metal unless otherwise indicated

2. Protective Coating: Comply with AISI S220; ASTM A653/A653M, G40; or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.
  - a. Coating demonstrates equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.
- B. Studs and Track: AISI S220 and ASTM C645, Section 10.
  1. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection but not less than 0.0179 inch.
  2. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide the following:
  1. Single Long-Leg Track System: ASTM C645 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. 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.
- 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.
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
  1. Minimum Base-Steel Thickness: 0.0269 inch.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C645.
  1. Minimum Base-Steel Thickness: 0.0179 inch.
  2. Depth: 7/8 inch.

## 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A641/A641M, 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 AC01, AC193, AC58, or AC308 as appropriate for the substrate.
    - a. Podium Structural Slab: Use of embed plates for attachment to podium slab. Should post-installed anchors be necessary, coordinate attachments to podium slab with Structural Engineer prior to placement. DO NOT damage or cut reinforcing bars.
    - b. Uses: Securing hangers to structure.
    - c. Type: Torque-controlled, expansion anchor or adhesive anchor.

- d. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
  - 1. Depth: 2 inches.
- E. 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 C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
    - a. Minimum Base-Steel Thickness: 0.0269 inch.
    - b. Depth: 1-5/8 inches.
  - 3. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.
    - a. Minimum Base-Steel Thickness: 0.0296 inch.

## 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:
  - 1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
  - 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 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 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.

### 3.2 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.
- B. Install studs so flanges within framing system point in same direction.
- C. 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.
- D. 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.
- E. 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.

### 3.3 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.
- 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. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
- 5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
- 6. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. 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

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## SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Suspension system for interior ceilings.

B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Ceiling suspension system plans indicating the following:

1. Structural framing, layout of ceiling furring and locations and types of acoustic hangers.

#### 1.3 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

### PART 2 - PRODUCTS

#### 2.1 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.
  - 1. Floor-Ceiling Assemblies: 55 STC
  - 2. Corridor and Demising Walls: 55 STC.

## 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. Manufacturers: Subject to compliance with requirements, provide the products listed in Part 2 by one of the following:

- 1. CertainTeed Corp.
- 2. Georgia-Pacific Gypsum LLC.
- 3. Continental Building Products, Inc.
- 4. National Gypsum Company.
- 5. USG Corporation.

- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

- 1. Product:
  - a. CertainTeed Corp.; ProRoc Type X
  - b. Georgia-Pacific Gypsum LLC; Fireguard.
  - c. Continental Building Products, Inc.; Firecheck Type X
  - d. National Gypsum Company; Gold Bond BRAND Fire-Shield
  - e. USG Corporation; SHEETROCK Brand Firecode.
- 2. Thickness: 5/8 inch.
- 3. Long Edges: Tapered.
- 4. Provide fire rated Type C, 1/2-inch thick gypsum board where required to comply with fire test listing.

- C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

- 1. Product
  - a. CertainTeed Corp.; ProRoc Moisture and Mold Resistant.
  - b. G-P Gypsum Corp.; Mold-Guard.
  - c. Continental Building Products, Inc.; Mold Defense.
  - d. National Gypsum Company; Gold Bond BRAND XP.
  - e. Temple-Inland; ComfortGuard.
  - f. United States Gypsum Co.; SHEETROCK Brand Mold Tough.

2. Core: 5/8 inch, Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

## 2.4 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Products:
  - a. Certaineed Corp.; GlassRoc Tile Backer.
  - b. Georgia-Pacific Gypsum, LLC; DensShield Tile Backer.
  - c. Temple-Inland; GreenGlass Fiberglass-Faced Gypsum Tile Backer Board.
2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

- B. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products:
  - a. Certaineed Corp.; FiberCement BackerBoard.
  - b. Custom Building Products; Wonderboard.
  - c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
  - d. National Gypsum Company; Permabase Cement Board.
  - e. United States Gypsum Co.; DUROCK Cement Board.
2. Thickness: 5/8 inch.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

## 2.5 SPECIALTY GYPSUM BOARD

- A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.

1. Products:
  - a. CertainTeed Corp.; Type C or C-AR.
  - b. Continental Building Products, Inc.; Firecheck Type C.
  - c. Georgia-Pacific Gypsum LLC; Toughrock Fireguard C.
  - d. National Gypsum Company; Gold Bond BRAND Fire-Shield Type C.
  - e. USG Corporation; SHEETROCK Brand Firecode C.
2. Thickness: (1/2" or 5/8") as required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

## 2.6 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- A. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.

1. Products:

- a. Certainteed Corp.; ProRoc Exterior Soffit Board.
- b. Georgia-Pacific Gypsum, LLC; ToughRock Soffit Board.
- c. Continental Building Products, Inc.; Soffitboard.
- d. National Gypsum Company; Gold Bond Exterior Soffit Board.
- e. United States Gypsum Co.; SHEETROCK Brand Exterior Gypsum Ceiling Board.

2. Core: 5/8 inch, Type X.

## 2.7 CEILING SUSPENSION SYSTEMS

- A. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Minimum Base-Steel Thickness: 20 gage, 0.0359 inch.
2. Depth: 7/8 inch.

- B. Furring Channel Suspension Hanger: Kinetics Noise Control, Wave Acoustic leaf spring hanger.

1. Hanger Types: Wave 44 and Wave 22.

- C. Acoustic Perimeter Tape: Kinetics Noise Control, CPT or comparable product substitute subject to approval by Architect.

## 2.8 TRIM ACCESSORIES

- A. Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, or plastic.
2. Shapes: Cornerbead and as indicated.

## 2.9 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.

- B. Joint Tape: Paper.

- C. Joint Compound for Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. For applications using mold-resistant gypsum board products use joint treatment products designed for this use.
2. Use either setting-type taping or drying-type, all-purpose compound except as follows:

- a. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
- b. Installation of Paper-Faced Metal Trim Accessories: Use setting-type compound.

## 2.10 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  - 1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
  - 2. For fastening furring channel suspension hanger, use screws and rubber washers of type and size recommended by hanger manufacturer.
- C. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

## 2.11 ACOUSTICAL ACCESSORIES

- A. 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.
- B. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
  - 1. Products:
    - a. Philips Manufacturing; RC-1
    - b. Deitrich; RCSD RC Deluxe
  - 2. Configuration: Asymmetrical.
- C. Acoustical Joint Sealant: As specified in Division 07 Section "Joint Sealants."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install ceiling perimeter tape at perimeter of ceiling according to manufacturer's instructions.
- B. Install hangers and furring channels according to manufacturer's instructions and reviewed shop drawings.
  - 1. Join furring channels lengthwise with double strands of steel tie wire.
  - 2. 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.
- C. Follow recommended ceiling de-coupling requirements including:
  - 1. Do not allow furring channel to touch perimeter walls.
  - 2. Select appropriate size fasteners so gypsum board and furring channel fasteners do not touch or penetrate supporting wood framing.
- D. Install seismic restraint plates as recommended by manufacturer.

### 3.3 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, except floors. 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. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. 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 recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.4 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the locations 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 vertically (parallel to framing) or 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. 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. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

### 3.5 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.

### 3.6 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 at locations indicated on Drawings or if not indicated, according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners unless otherwise indicated.
  - 2. LC, L, and U-Bead: Use at exposed panel edges where indicated.

### 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 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 4: At panel surfaces that will be exposed to view unless otherwise indicated.
- E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

- F. 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.

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## SECTION 093013 - CERAMIC TILING

### 1.1 SUMMARY

#### A. Section Includes:

1. Ceramic tile.
2. Waterproof and crack isolation membrane for thinset applications.
3. Metal edge strips.

### 1.2 ACTION SUBMITTALS

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

### 1.3 INFORMATIONAL SUBMITTALS

#### A. Qualification Data: For Installer.

### 1.4 QUALITY ASSURANCE

#### A. Installer Qualifications:

1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
2. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

### 2.2 TILE PRODUCTS

#### A. Tile Products: As selected by Owner.

## 2.3 WATERPROOF AND CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
  - 1. Basis of Design: Subject to compliance with requirements, provide Custom Building Products; RedGard Waterproofing and Crack Prevention Membrane or a comparable product by one of the following:
    - a. Bostik, Inc; Durabond D-222 Duraguard Membrane.
    - b. C-Cure; Pro-Red Waterproofing and Crack Prevention Membrane.
    - c. H.B. Fuller Construction Products Inc. / TEC; HydraFlex - Waterproofing Crack Isolation Membrane.
    - d. Jamo Inc; Waterproof.
    - e. LATICRETE SUPERCAP, LLC; Laticrete Hydro Ban or Laticrete Hydro Barrier.
    - f. MAPEI Corporation; Mapelastic™ AquaDefense.
    - g. Parex USA, Inc.; HydroGuard 1.
    - h. Southern Grouts & Mortars, Inc; Southcrete 1132.

## 2.4 SETTING MATERIALS

- A. For wall applications, provide nonsagging mortar.
- B. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ARDEX Americas.
    - b. C-Cure.
    - c. H.B. Fuller Construction Products Inc. / TEC.
    - d. Laticrete International, Inc.
    - e. MAPEI Corporation.
    - f. Parex USA, Inc.
  - 2. For wall applications, provide nonsagging mortar.

## 2.5 GROUT MATERIALS

- A. High-Performance Tile Grout: ANSI A118.7.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ARDEX Americas.
    - b. C-Cure.

- c. H.B. Fuller Construction Products Inc. / TEC.
- d. Laticrete International, Inc.
- e. MAPEI Corporation.
- f. Southern Grouts & Mortars, Inc.

- B. Grout for PregROUTED Tile Sheets: Same product used in factory to pregROUT tile sheets.

## 2.6 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
- C. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
  - 2. Verify that concrete substrates for tile floors installed with thinset or medium bed mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset or medium bed mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

### 3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    - a. Tile floors consisting of tiles 8 by 8 inches or larger.
  - 2. Use medium bed mortar for any tile with any edge longer than 15 inches (large format tile).
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: As indicated on Drawings or if not indicated, in manufacturer's standard layout pattern. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- F. Joint Widths: As recommended by tile manufacturer.
- G. Metal Edge Strips:
  - 1. Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile
  - 2. Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- H. Floor Sealer: Apply floor sealer to non-epoxy cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

- I. Install tile backing panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.
- J. Install waterproofing and crack isolation membrane to comply with ANSI A108.13, ANSI A108.17, and manufacturer's written instructions to produce waterproof and crack isolation membrane of uniform thickness that is bonded securely to substrate.

### 3.4 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
  - 1. Ceramic Tile Installation: TCNA F113; Thinset mortar.
    - a. Thinset Mortar: Improved modified dry-set mortar.
    - b. Grout: High-performance sanded grout.
- B. Interior Floor Installations, Wood Subfloor:
  - 1. TCNA F144: Thinset mortar on waterproof membrane over cementitious backer units or fiber-cement backer board.
    - a. Thinset Mortar: Improved modified dry-set mortar
    - b. Grout: High-performance sanded grout.
- C. Interior Wall Installations, Wood or Metal Studs or Furring:
  - 1. TCNA W244C or TCNA W244F: Thinset mortar on cementitious backer units or fiber-cement backer board.
    - a. Thinset Mortar: Improved modified dry-set mortar.
    - b. Grout: High-performance unsanded grout.
- D. Bathtub/Shower Wall Installations, Wood or Metal Studs or Furring:
  - 1. TCNA B412: Thinset mortar on cementitious backer units or fiber-cement backer board.
    - a. Thinset Mortar: Improved modified dry-set mortar.
    - b. Grout: High-performance unsanded grout.

END OF SECTION 093013

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SECTION 095113 - ACOUSTICAL PANEL CEILINGS **- NOT FULLY EDITED**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. <Double click to insert sustainable design text for ceilings.>
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Class A according to ASTM E1264.
  - 2. Smoke-Developed Index: [50] [450] <Insert value> or less.



## 2.2 ACOUSTICAL PANELS <Insert drawing designation>

Copy this article and re-edit for each product.

Insert drawing designation for each product required. Use the same designation for the acoustical panels in this article and for the related suspension system in "Metal Suspension System" Article; together, they make up the ceiling assembly. Use these designations on Drawings to identify each ceiling assembly.

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Acoustical Panel Standard: Manufacturer's standard panels according to ASTM E1264.
- C. [<Double click to insert sustainable design text for recycled content.>](#)

Before retaining paragraphs below, verify availability with manufacturers. Do not assume that every combination of classification, pattern, color, light reflectance, acoustical rating, edge detail, thickness, and size listed under each product description is available.

- D. Classification: <Insert type, form, and pattern>.
- E. Color: White
- F. Light Reflectance (LR): <Insert LR>.
- G. Ceiling Attenuation Class (CAC): <Insert CAC>.

Retain "Noise Reduction Coefficient (NRC)" or "Articulation Class (AC)" Paragraph below if required.

- H. Noise Reduction Coefficient (NRC): <Insert NRC>.
- I. Articulation Class (AC): <Insert AC>.
- J. Edge/Joint Detail: [Square] [Reveal sized to fit flange of exposed suspension-system members] [Flush reveal sized to fit flange of exposed suspension-system members] [Beveled, kerfed, and rabbeted long edges and square, butt-on short edges] [As indicated by manufacturer's designation] <Insert requirement>.
- K. Thickness: [1/8 inch (3 mm)] [7/16 inch (12 mm)] [9/16 inch (15 mm)] [5/8 inch (15 mm)] [3/4 inch (19 mm)] [7/8 inch (22 mm)] [1 inch (25 mm)] [1-1/2 inches (38 mm)] [2 inches (51 mm)] [3 inches (76 mm)] [As indicated on Drawings] [As indicated in a schedule] <Insert dimension>.
- L. Modular Size: 24 by 24 inches (610 by 610 mm) or 24 by 48 inches (610 by 1220 mm).

## 2.3 METAL SUSPENSION SYSTEM <Insert drawing designation>

Copy this article and re-edit for each product.

Insert drawing designation for each product required. Use the same designation for the suspension system in this article and for the related acoustical panels in "Acoustical Panels" Article; together, they make up the ceiling assembly. Use these designations on Drawings to identify each ceiling assembly.

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M.
- C. [<Double click to insert sustainable design text for recycled content.>](#)

Retain one of two suspension-system paragraphs below. Paragraphs are examples of suspension systems for acoustical panel ceilings; revise to suit Project.

- D. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, **G30 (Z90)** coating designation; with prefinished **15/16-inch- (24-mm-)** wide metal caps on flanges.
  - 1. Structural Classification: **[Intermediate]** **[Heavy]**-duty system.
  - 2. End Condition of Cross Runners: **[Override (stepped)]** **[or]** **[butt-edge]** type.
  - 3. Face Design: Flat, flush.
  - 4. Cap Material: **[Cold-rolled steel]** **[or]** **[aluminum]**.

Coordinate finish in "Cap Finish" Subparagraph below with cap material selected.

- 5. Cap Finish: **[Painted white]** **[Painted in color as selected from manufacturer's full range]** **[Painted to match color indicated by manufacturer's designation]** **[Painted to match color of acoustical unit]** **[Plated with metallic finish as selected from manufacturer's full range]** **[Plated with metallic finish indicated by manufacturer's designation]** **[Natural finish for aluminum]**.
- E. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, **G30 (Z90)** coating designation; with prefinished **9/16-inch- (15-mm-)** wide metal caps on flanges.
  - 1. Structural Classification: **[Intermediate]** **[Heavy]**-duty system.
  - 2. End Condition of Cross Runners: **[Override (stepped)]** **[or]** **[butt-edge]** type.
  - 3. Face Design: **[Flat, flush]** **[Flanges formed with an integral center reveal]**.
  - 4. Cap Material: **[Cold-rolled steel]** **[or]** **[aluminum]**.

Coordinate finish in "Cap Finish" Subparagraph below with cap material selected.

- 5. Cap Finish: **[Painted white]** **[Painted in color as selected from manufacturer's full range]** **[Painted to match color indicated by manufacturer's designation]** **[Painted to match color of acoustical unit]** **[Plated with metallic finish as selected from manufacturer's full range]** **[Plated with metallic finish indicated by manufacturer's designation]** **[Natural finish for aluminum]**.

## 2.4 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

## 2.5 METAL EDGE MOLDINGS AND TRIM <Insert drawing designation>

Copy this article and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Revise "Roll-Formed, Sheet-Metal Edge Moldings and Trim" Paragraph below to suit Project and insert additional types of trim if required.

- 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.

## PART 3 - EXECUTION

### 3.1 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.
- B. Layout openings for penetrations centered on the penetrating items.

### 3.2 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C636/C636M and manufacturer's written instructions.
- B. 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 edge moldings before they are installed.
  - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

END OF SECTION 095113

## SECTION 096513 - RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Thermoset-rubber base.
  - 2. Rubber stair accessories.
  - 3. Rubber molding accessories.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

### PART 2 - PRODUCTS

#### 2.1 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
  - 2. Flexco.
  - 3. Johnsonite; a Tarkett company.
  - 4. Roppe Corporation, USA.
- B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
  - 1. Style and Location:
    - a. Style B, Cove: Provide in areas indicated.
- C. Thickness: 0.125 inch.
- D. Height: 4 inches 6 inches As indicated on Drawings.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.

- G. Inside Corners: Preformed.
- H. Colors: As selected from manufacturer's full range.

## 2.2 RUBBER STAIR ACCESSORIES

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 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: Subject to compliance with requirements, provide Roppe No. 3 stair nosing or a comparable product by one of the following:
  - 1. Armstrong World Industries, Inc.
  - 2. Johnsonite; a Tarkett company.
  - 3. Nora Systems, Inc.
- C. Stair Nosing:
  - 1. Type: TS (rubber, vulcanized thermoset).
  - 2. Nosing Style: Rounded front edge with striation on top for slip resistance.
  - 3. Nosing Width: 2.5 inch nominal.
  - 4. Nosing Height: 1.5 inches nominal.
  - 5. Thickness: 1/8.
  - 6. Size: Lengths to fit each stair tread in one piece.
- D. Colors and Patterns: As selected by Architect from manufacturer's standard full range.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
- C. Stair Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.2 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.

### 3.3 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. Install accessory trim to establish linear transitions between resilient stair accessories and adjacent flooring.

- 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.

#### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. 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 SUMMARY

- A. Section Includes:
  - 1. Solid vinyl floor tile.
  - 2. Vinyl composition floor tile.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and pattern specified.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation.

### 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 E648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

#### 2.2 SOLID VINYL FLOOR TILE

- A. Tile Standard: ASTM F1700.
  - 1. Class: Class III, Printed Film Vinyl Tile.



2. Type: B, Embossed Surface.

B. Total Thickness: 0.080 inch.

C. Wearing Surface Thickness:

1. Dwelling Units: 0.012-inches minimum.

2. Common Areas: 0.028-inches minimum.

D. Size: As selected by Owner

E. Colors and Patterns: As selected by Owner.

## 2.3 VINYL COMPOSITION FLOOR TILE

A. Basis of Design: As selected by Owner

B. Tile Standard: ASTM F1066.

C. Thickness: 0.125 inch.

D. Size: 12 by 12 inches.

E. Colors and Patterns: As selected by Owner.

## 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.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

## PART 3 - EXECUTION

### 3.1 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 F710.

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 9 pH.
4. 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 F1869. 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 F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
  1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.2 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.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

- G. 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.
- H. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
  - 1. Apply two coat(s).

END OF SECTION 096519

SECTION 096566 - RESILIENT ATHLETIC FLOORING **NOT FULLY EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interlocking, rubber floor tile.
2. Rubber floor tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. [<Double click to insert sustainable design text for recycled content.>](#)
2. [<Double click to insert sustainable design text for adhesives.>](#)
3. [<Double click to insert sustainable design text for paints and coatings.>](#)
4. [<Double click to insert sustainable design text for flooring.>](#)

C. Samples: For each exposed product and for each type, color, and pattern specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

Manufacturers and products listed in SpecAgent and Masterworks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

2.1 PERFORMANCE REQUIREMENTS

A. [<Double click to insert sustainable design text for flooring.>](#)

2.2 INTERLOCKING, RUBBER FLOOR TILE **<Insert drawing designation>**

[Copy this article and re-edit for each product.](#)

Insert drawing designation. Use these designations on Drawings to identify each product.

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Description: Athletic flooring consisting of modular rubber tiles with precision cut, interlocking edges, for free-lay installation.
- C. Material: **[Rubber]** **[Recycled-rubber compound]**.
  - 1. [<Double click to insert sustainable design text for recycled content.>](#)

If applicable, insert fire-test-response characteristics. See "Fire-Test-Response Characteristics" Article in the Evaluations.

- D. Tile Interlock: **[Visible]** **[Hidden]**.
- E. Traffic-Surface Texture: **[Smooth]** **[Nondirectional, stipple texture]** **[Textured]** **<Insert texture>**.
  - 1. Provide reversible tiles (with traffic-surface texture on both sides).
- F. Size: **[Manufacturer's standard-size square tile]** **[24 inches (610 mm) square]** **<Insert dimension>**.
- G. Thickness: **[3/8 inch (9.5 mm)]** **[7/16 inch (11.1 mm)]** **[1/2 inch (13 mm)]** **[9/16 inch (14.3 mm)]** **[3/4 inch (19 mm)]** **<Insert dimension>**.
- H. Weight: Not less than **<Insert weight>** per tile.

If retaining second option in "Color and Pattern" Paragraph below, indicate colors and patterns with manufacturers' product designations in "Basis-of-Design Product" Paragraph or in a separate schedule.

- I. Color and Pattern: **[As selected by Architect from manufacturer's full range]** **[As indicated by manufacturer's designations]** **<Insert color and pattern>**.
- J. Border: Interlocking, beveled-edge tiles, of same material as floor tile; with bevels that transition from thickness of floor tile to surface below it; with straight outside edges; for use where flooring corners and edges do not abut vertical surfaces.

If retaining third option in "Border Color and Pattern" Subparagraph below, indicate colors and patterns with manufacturers' product designations above or in a separate schedule.

- 1. Border Color and Pattern: **[Matching floor tile]** **[As selected by Architect from manufacturer's full range to contrast with floor tile]** **[As indicated by manufacturer's designations]** **<Insert color and pattern>**.

## 2.3 RUBBER FLOOR TILE **<Insert drawing designation>**

Copy this article and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Description: Athletic flooring consisting of modular rubber tiles with smooth edges for adhered application.
- C. Material: **[Rubber] [Recycled-rubber compound] [Rubber wear layer and rubber shock-absorbent layer, vulcanized together]** **<Insert description>**.
  - 1. [<Double click to insert sustainable design text for recycled content.>](#)

If applicable, insert fire-test-response characteristics. See "Fire-Test-Response Characteristics" Article in the Evaluations.

- D. Traffic-Surface Texture: **[Smooth] [Nondirectional, stipple texture] [Textured]** **<Insert description>**.
- E. Size: **[Manufacturer's standard-size square tile] [18 inches (457 mm) square] [24 inches (610 mm) square] [36 inches (914 mm) square]** **<Insert dimension>**.
- F. Thickness: **[5/32 inch (4 mm)] [1/4 inch (6.4 mm)] [3/8 inch (9.5 mm)] [1/2 inch (13 mm)]** **<Insert dimension>**.
- G. Weight: Not less than **<Insert weight>** per tile.

If retaining second option in "Color and Pattern" Paragraph below, indicate colors and patterns with manufacturers' product designations in "Basis-of-Design Product" Paragraph or in a separate schedule.

- H. Color and Pattern: **[As selected by Architect from manufacturer's full range] [As indicated by manufacturer's designations]** **<Insert color and pattern>**.
- I. Border: Interlocking, beveled-edge tiles, of same material as floor tile; with bevels that transition from thickness of floor tile to surface below it; with straight outside edges; for use where flooring corners and edges do not abut vertical surfaces.

If retaining third option in "Border Color and Pattern" Subparagraph below, indicate colors and patterns with manufacturers' product designations above or in a separate schedule.

- 1. Border Color and Pattern: **[Matching floor tile] [As selected by Architect from manufacturer's full range to contrast with floor tile] [As indicated by manufacturer's designations]** **<Insert color and pattern>**.

## 2.4 ACCESSORIES

- A. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer.

Retain "Adhesives" Paragraph below for adhered products.

- B. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated.

1. [<Double click to insert sustainable design text for flooring adhesive.>](#)
2. [<Double click to insert sustainable design text for adhesives.>](#)

Verify, with manufacturers, availability and applicability of game-line and marker paint for flooring products.

- C. Game-Line and Marker Paint: Complete system including primer, if any, compatible with flooring and recommended in writing by flooring and paint manufacturers for use indicated.

1. [<Double click to insert sustainable design text for floor treatment products.>](#)

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of flooring.
- B. Concrete Substrates: Prepare according to ASTM F710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  2. Alkalinity Testing: Perform pH testing according to ASTM F710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.
    - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 FLOORING INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions.

- B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, nonstaining marking device.

### 3.3 FLOOR TILE INSTALLATION

- A. Lay out 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**] [**at a 45-degree angle with room axis**] [**in pattern indicated**] <Insert requirements>.
- B. Discard broken, cracked, chipped, or deformed tiles.

Retain "Tile Matching" Paragraph below if applicable.

- C. Tile Matching: Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged if so numbered.
  - 1. Lay tiles [**with grain running in one direction**] [**with grain direction alternating in adjacent tiles (basket-weave pattern)**] [**in pattern of colors and sizes indicated**].

Retain "Adhered Floor Tile" Paragraph below if tiles are adhered to substrates.

- D. Adhered Floor Tile: Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
  - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

Retain "Free-Lay Tile" Paragraph below if tiles are free laid.

- E. Free-Lay Tile: Place flooring at locations indicated with units securely interconnected and fully seated on substrate to form a smooth, level surface.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing flooring installation:

Retain first subparagraph below if products are adhered.

- 1. Remove adhesive and other blemishes from flooring surfaces.



2. Sweep and vacuum flooring thoroughly.
  3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.
- B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

Insert other protective measures recommended in writing by manufacturers for products retained.

Final cleaning is usually not Work of this Section. Specify final cleaning requirements in Section 017700 "Closeout Procedures."

END OF SECTION 096566

SECTION 096813 - TILE CARPETING **- NOT FULLY EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modular carpet tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. [<Double click to insert sustainable design text for adhesives.>](#)
2. [<Double click to insert sustainable design text for carpeting products.>](#)
3. [<Double click to insert sustainable design text for flooring.>](#)

C. Samples: For each exposed product and for each color and texture required.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Certified by the International Certified Floorcovering Installers Association

1.6 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.

[Verify available warranties and warranty periods for carpet tiles.](#)

1. Warranty Period: [10] <Insert number> years from date of Substantial Completion.

If Installer's warranty is available and required, insert here.

## PART 2 - PRODUCTS

Manufacturers and products listed in SpecAgent and Masterworks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

### 2.1 CARPET TILE <Insert drawing designation>

Copy this article and re-edit for each product required.

Insert drawing designation. Use these designations on Drawings to identify each product.

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Generally, retain "Color" and "Pattern" paragraphs below unless they are described by product designation inserted above.

- B. Color: [As indicated by manufacturer's designations] [Match Architect's samples] [As selected by Architect from manufacturer's full range] <Insert color>.
- C. Pattern: [Match Architect's samples] <Insert pattern>.
- D. Fiber Content: [100 percent nylon 6, 6] [100 percent nylon 6] [100 percent polypropylene] [100 percent wool] [80 percent wool; 20 percent nylon 6, 6] [80 percent wool; 20 percent nylon 6] <Insert percentage>.

Retain "Fiber Type" Paragraph below and insert proprietary fiber type such as Antron, Ultron, or Zeftron if required.

- E. Fiber Type: <Insert proprietary fiber type>.
- F. Pile Characteristic: [Level-loop] [Cut] [Cut-and-loop] <Insert construction> pile.
- G. Yarn Twist: <Insert TPI (TPCM)>.
- H. Yarn Count: <Insert count>.
- I. Density: <Insert oz./cu. yd. (g/cu. cm)>.

"Pile Thickness" Paragraph below is applicable only to finished level-loop and cut-pile constructions with tuft heights less than 1/4 inch (6.3 mm).

- J. Pile Thickness: <Insert inches (mm)> for finished carpet tile[ according to ASTM D6859].

K. Stitches: **<Insert stitches per inch (mm)>**.

L. Gage: **<Insert ends per inch (mm)>**.

Do not include weight of backings in "Surface Pile Weight" Paragraph below.

M. Surface Pile Weight: **<Insert oz./sq. yd. (g/sq. m)>**.

N. Total Weight: **<Insert oz./sq. yd. (g/sq. m)>** for finished carpet tile.

Retain "Primary Backing/Backcoating" or "Secondary Backing" Paragraph below, or both, or retain "Backing System" Paragraph below to describe backing system.

Revise "Primary Backing/Backcoating" Paragraph to suit Project; for example, if antimicrobial treatment is integral to backing formulation, if backing density and thickness are optional characteristics to be selected, or if performance characteristics and test method results for backings are available.

O. Primary Backing/Backcoating: **[Manufacturer's standard composite materials] [PVC] [Fiberglass-reinforced PVC] [Fiberglass-reinforced amorphous resin] [Reinforced polyurethane composite cushion] [Reinforced polyurethane composite] [Reinforced thermoplastic copolymer] <Insert specific primary backing materials; consult manufacturers>**.

Retain "Secondary Backing" Paragraph below if required.

P. Secondary Backing: **[Manufacturer's standard material] <Insert specific secondary backing material>**.

Q. Backing System: **<Insert proprietary name>**.

R. Size: **[18 by 18 inches (457 by 457 mm)] [24 by 24 inches (610 by 610 mm)] [18 by 36 inches (457 by 914 mm)] [36 by 36 inches (914 by 914 mm)] <Insert dimensions>**.

S. Applied Treatments:

Retain "Soil-Resistance Treatment" Subparagraph below unless soil resistance is integral to carpet fiber or if soil resistance is not needed for Project; consult manufacturer.

1. Soil-Resistance Treatment: **[Manufacturer's standard treatment] <Insert treatment>**.

Retain "Antimicrobial Treatment" Subparagraph below unless antimicrobial treatment is integral to carpet or if antimicrobial treatment is not needed for Project; consult manufacturer.

2. Antimicrobial Treatment: **[Manufacturer's standard treatment] <Insert 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.

T. Sustainable Design Requirements:

Retain "Sustainable Product Certification" Subparagraph below if compliance with ANSI/NSF 140 is required. Verify availability of certification with manufacturers.

1. Sustainable Product Certification: [**Silver**] [**Gold**] [**Platinum**] level certification according to ANSI/NSF 140.
2. <Double click to insert sustainable design text for carpet and cushion.>

U. Performance Characteristics:

1. Appearance Retention Rating: [**Moderate traffic, 2.5**] [**Heavy traffic, 3.0**] [**Severe traffic, 3.5**] **<Insert number>** minimum according to ASTM D7330.

Retain or revise "Critical Radiant Flux Classification" Subparagraph below after verifying requirements of authorities having jurisdiction.

2. Critical Radiant Flux Classification: Not less than [**0.45 W/sq. cm**] [**0.22 W/sq. cm**] according to NFPA 253.
3. Dry Breaking Strength: Not less than **100 lbf (445 N)** according to ASTM D2646.

First and second options in "Tuft Bind" Subparagraph below are HUD-recommended minimums for cut pile and loop pile, respectively, according to its Use of Materials Bulletin No. 44d. Third option is minimum average recommended by the Carpet and Rug Institute for school carpet with backing other than unitary backing. INVISTA (www.invista.com), a carpet fiber manufacturer, recommends 5 lbf (22 N) for cut pile and 10 lbf (45 N) for loop pile. More than 5 lbf (22 N) for cut pile and 10 lbf (45 N) for loop pile may be required for high-frequency traffic locations.

4. Tuft Bind: Not less than [**3 lbf (13 N)**] [**5 lbf (22 N)**] [**6.2 lbf (28 N)**] [**8 lbf (36 N)**] [**10 lbf (45 N)**] **<Insert value>** according to ASTM D1335.

Retain "Delamination" Subparagraph below if carpet has secondary backing. First option is recommended by the Carpet and Rug Institute for carpet with primary and secondary backing installed in schools. Second option is required by GSA according to its "Technical Requirements Booklet for Carpet, Carpet Tiles and Carpet Cushion FSC Group 72, Part I, Section A."

5. Delamination: Not less than [**3.5 lbf/in. (0.6 N/mm)**] [**4 lbf/in. (0.7 N/mm)**] **<Insert value>** according to ASTM D3936.
6. Dimensional Tolerance: Within **1/32 inch (0.8 mm)** of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).

Retain "Noise Reduction Coefficient (NRC)" Subparagraph below if required.

8. Noise Reduction Coefficient (NRC): **<Insert NRC>** according to ASTM C423.
9. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.

First option in "Colorfastness to Light" Subparagraph below is minimum recommended by the Carpet and Rug Institute for carpet for general use; second option is for carpet installed in schools.

10. Colorfastness to Light: Not less than 4 after [**40**] [**60**] **<Insert number>** AFU (AATCC fading units) according to AATCC 16, Option E.

First option in "Electrostatic Propensity" Subparagraph below is typical for commercial carpet tile for general use; second option may be available for greater static control.

11. Electrostatic Propensity: Less than [**3.5**] [**2**] **<Insert number>** kV according to AATCC 134.

Insert other performance characteristics to suit Project, such as smoke density, or additional colorfastness characteristics.

## 2.2 INSTALLATION ACCESSORIES

Revise "Trowelable Leveling and Patching Compounds" Paragraph below to suit Project.

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

Revise "Adhesives" Paragraph below to suit product(s) and Project.

- 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. <Double click to insert sustainable design text for VOC content of adhesive.>
  - 2. <Double click to insert sustainable design text for adhesives.>

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Concrete Slabs:

Retain "Moisture Testing" Subparagraph below for adhesively applied products. Excessive moisture vapor can cause failure of systems installed on slabs-on-grade. ASTM F1869 (anhydrous calcium chloride test) and ASTM F2170 (relative humidity test) both recommend one test per 1000 sq. ft. (304.8 sq. m) but no fewer than three tests per test area.

- 1. Moisture Testing: Perform tests so that each test area does not exceed [**200 sq. ft. (18.6 sq. m)**] [**1000 sq. ft. (304.8 sq. m)**] **<Insert area>**, and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

Retain "Anhydrous Calcium Chloride Test" or "Relative Humidity Test" Subparagraph below, or both.

Option in "Anhydrous Calcium Chloride Test" Subparagraph below is based on the Carpet and Rug Institute's CRI 104 and on floor-covering industry practices for adhered floor coverings to avoid adhesive failures.

- a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of [**3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)**] **<Insert emission>** in 24 hours.
- b. Relative Humidity Test: Using in situ probes, ASTM F2170. 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 testing.

- B. Wood Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- C. Metal Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- D. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.

### 3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 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 (3 mm)** wide or wider, and protrusions more than **1/32 inch (0.8 mm)** 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. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

Revise "Installation Method" Paragraph below if using mill-applied, peel-and-stick adhesives or standard adhesives. Full-spread, glue-down installation is appropriate for wheel traffic. Partial glue-down installation is appropriate for carpet tiles of moderate dimensional stability, weight, and mass. Free-lay installation is appropriate for dimensionally stable carpet tiles with heavy backings. Revise second option below for spot-glued installation if recommended in writing by manufacturer.

- B. Installation Method: **[As recommended in writing by carpet tile manufacturer] [Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive] [Partial glue down; install periodic tiles with releasable, pressure-sensitive adhesive] [Free lay; install carpet tiles without adhesive].**
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.

- 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.
- H. Install pattern parallel to walls and borders.
- I. 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.

END OF SECTION 096813



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## SECTION 099100 - PAINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Surface preparation and the application of paint systems on exterior and interior substrates.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include the following:
  - 1. Preparation requirements.
  - 2. Application instructions.
  - 3. VOC content.
- B. Samples: For each type of topcoat product.
- C. Product Schedule: Use same designations indicated on Drawings and in the Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

#### 1.3 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.
- A. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    - b. Other Items: Architect will designate items or areas required.

2. For interior Work, apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on mockups.
  - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

#### 1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide the products listed in Part 2 by one of the following:
  1. BMC Benjamin Moore & Co.
  2. PPG PPG Architectural Finishes, Inc.
  3. SWC Sherwin-Williams Company (The)
- B. Products:
  1. Painting products listed in Part 2 of this Section may or may not be used in the Project. See Part 3 Articles "Interior Painting Schedule" and "Exterior Painting Schedule for coating systems specified for the Project.

C. MPI Standards: The MPI product numbers referenced in this Section are included **AS A GUIDE ONLY:**

1. Paint products listed under the MPI product number may or may not be listed by MPI as an approved product, but are the products approved for use on this Project.
2. Products complying with the referenced MPI product number, but not listed in this Section, are not approved for the Project.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content (Indicated by number in parentheses after product name): 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. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

C. Color: As selected by Owner.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors is not intended to imply that products named are required to be used to the exclusion of the other specified equivalent manufacturer's products.

D. Gloss Level: Provide the gloss levels below based on MPI Gloss standards that measure objective gloss and sheen levels at specific angles:

1. Flat (FL)
  - a. MPI Gloss Level 1 (Matte or Flat Finish): Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
  - b. MPI Gloss Level 2 (Velvet Finish): Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
2. Low Sheen (LS)

- a. MPI Gloss Level 3 (Eggshell Finish): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
    - b. MPI Gloss Level 4 (Satin Finish): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
  3. Semi-Gloss (SC):
    - a. MPI Gloss Level 5 (Semi-Gloss Finish): 35 to 70 units at 60 degrees, according to ASTM D 523.
  4. Gloss (GL)
    - a. MPI Gloss Level 6 (Gloss Finish): 70 to 85 units at 60 degrees, according to ASTM D 523.
    - b. MPI Gloss Level 7 (High-Gloss Finish): More than 85 units at 60 degrees, according to ASTM D 523.
- E. Default Gloss Levels: Paint gloss levels are indicated in the finish schedule. If not indicated on the finish schedule, the following default requirements apply:
1. Exterior
 

|                                             |            |
|---------------------------------------------|------------|
| a. Concrete and Masonry Walls               | Flat       |
| b. Stucco                                   | Flat       |
| c. Dimension Lumber                         | Flat       |
| d. Siding (wood, cementitious, alum, vinyl) | Low Sheen  |
| e. Trim (wood, cementitious, alum, vinyl)   | Low Sheen  |
| f. Metal Lintels                            | Semi-Gloss |
| g. Decorative Metals                        | Gloss      |
| h. Handrails                                | Gloss      |
  2. Interior
 

|                                 |            |
|---------------------------------|------------|
| a. Walls                        | Low Sheen  |
| b. Toilet Room Walls            | Semi-Gloss |
| c. Kitchen (Food Prep.) Walls   | Semi-Gloss |
| d. Mechanical Rooms             | Semi-Gloss |
| e. Storage Rooms                | Semi-Gloss |
| f. Garage and Maintenance Rooms | Semi-Gloss |
| g. Ceilings                     | Flat       |
| h. Floors                       | Gloss      |
| i. Wood Trim (Opaque)           | Semi-Gloss |
| j. Wood Trim (Transparent)      | Low Sheen  |
| k. Metal Doors & Frames         | Semi-Gloss |
- F. Paint Material Legend
1. Mfr. Abbr.    Paint Name (VOC content).....Paint No/Designation.

## 2.3 PRIMERS/SEALERS

- A. **MPI #6** Primer, Latex, for Exterior Wood:
1. BMC Benjamin Moore Multi-Purpose Primer (29.5)..... 067
  2. PPG Seal Grip Gripper Int/Ext 100% Acrylic Latex Primer (<50)..... 17-921XI
  3. SWC Exterior Latex Wood Primer (87).....B42W08041
- B. **MPI #50** Primer Sealer, Latex, Interior:
1. BMC Ultra Spec 500 Interior Latex Primer (0)..... N534
  2. PPG Speedhide Zero Interior Zero VOC Latex Sealer (0) .....6-4900XI
  3. SWC Pro Mar 200 Zero VOC Interior Latex Primer (0).....B28W02600
- C. **MPI #39** Primer, Latex, for Interior Wood
1. BMC Benjamin Moore Multi-Purpose Primer (29.5)..... 067
  2. PPG Seal Grip Gripper Int/Ext 100% Acrylic Latex Primer (<50)..... 17-921XI
  3. SWC Multi-Purpose Int/Ext Latex Primer-Sealer (0) .....B51W00450
  - 4.
- D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

## 2.4 METAL PRIMERS

- A. **MPI #107** Primer, Rust-Inhibitive, Water Based:
1. BMC Ultra Spec HP Acrylic Metal Primer (48)..... HP04
  2. PPG Pitt-Tech Plus Int/Ext DTM Industrial Primer, White (<100).....4020 PF
  3. SWC Pro Industrial Pro-Cryl Universal Primer (40).....B66W01310

## 2.5 WATER-BASED PAINTS

- A. **MPI # 10** Latex, Exterior, Flat (MPI Gloss Level 1)
1. BMC Ultra Spec Exterior Flat Finish (46)..... N447
  2. PPG Speedhide Exterior 100% Acrylic Latex Flat (<50) .....6-610XI
  3. SWC A-100 Exterior Latex Flat (37) .....A06W00151/A06WQ8151
- B. **MPI # 15** Latex, Exterior, Low Sheen (MPI Gloss Level 3-4)
1. BMC Ultra Spec Exterior Satin Finish (48.9)..... N448
  2. PPG Speedhide Exterior 100% Acrylic Latex Satin (<50) .....6-2045XI
  3. SWC A-100 Exterior Latex Satin (37) .....A82W00107
- C. **MPI #53** Latex, Interior, Flat, (Gloss Level 1):
1. BMC Ultra Spec 500 Interior Flat Finish (0).....T535

- 2. PPG Speedhide Zero Interior Latex Flat (0) .....6-5110
- 3. SWC ProMar 200 Zero VOC Interior Latex Flat (0) .....B30W12651
  
- D. **MPI #52** Latex, Interior, Eggshell, (Gloss Level 3):
  - 1. BMC Ultra Spec 500 Interior Eggshell Finish (0).....T538
  - 2. PPG Speedhide Zero Interior Latex Eggshell (0).....6-5310
  - 3. SWC ProMar 200 Zero VOC Interior Latex Eg-Shel (0).....B20W12651
  
- E. **MPI #54** Latex, Interior, Semi-Gloss, (Gloss Level 5):
  - 1. BMC Ultra Spec 500 Interior Semi Gloss Finish (0).....T546
  - 2. PPG Speedhide Zero Interior Latex Semi-Gloss (0).....6-5510
  - 3. SWC ProMar 200 Zero VOC Interior Latex Semi-Gloss (0).....B31W02651
  
- F. **MPI #168** Alkyd, Water Based, Eggshell (Gloss Level 3):
  - 1. BMC Advance Waterborne Interior Alkyd Satin (48).....792
  - 2. PPG
  - 3. SWC Pro Industrial Waterbased Alkyd Urethane Low Sheen (45) .....B53W02251
  
- G. **MPI #169** Alkyd, Water Based, Semi-Gloss, (Gloss Level 5):
  - 1. BMC Advance Waterborne Interior Alkyd Semi-Gloss (43) .....793
  - 2. PPG Speedhide Int/Ext WB Alkyd Semi-Gloss (<50).....6-1510XI
  - 3. SWC Pro Industrial Waterbased Alkyd Urethane Semi-Gloss (44).....B53W02151

## 2.6 MISCELLANEOUS MATERIALS

- A. Sealant (Painter's Caulk):
  - 1. Latex Sealant: Comply with ASTM C 834, Type P or C as required, Grade NF.
    - a. BMC Moorlastic 40 Year Siliconized Caulk #467
    - b. PPG Top Gun 200 Siliconized Acrylic
    - c. SWC 950A Siliconized Acrylic Latex Caulk

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.

2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and CMU): 12 percent.
4. Wood: 15 percent.
5. Gypsum Board: 12 percent.
6. Plaster: 12 percent.

- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
  1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Wood Substrates:



1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

- H. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
    - a. Primer may be omitted over metal surfaces that have been shop primed and touchup painted.
    - b. Primer may be omitted over previously painted surfaces except as required to provide compatibility between existing coating and finish coat and as required to cover bare substrate.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, and Electrical Work: Paint exposed plumbing, heating, and electrical material to match the walls and ceilings of that area unless noted otherwise. This includes, but is not limited to, pipes, insulation, conduit ducts, access panels, grilles, diffusers, whether the adjacent surfaces receive paint or not. Include dampers or baffles behind grilles.
1. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

## F. Surfaces and Items Not to be Painted:

1. Do not paint prefinished items, concealed surfaces, finished metal surfaces, and operating parts unless noted otherwise.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
3. Do not paint mechanical and electrical Work in mechanical and electrical equipment rooms except as indicated in Divisions 20 through 26 or as indicated otherwise on the Drawings.
4. Communication, and Electronic Safety and Security Work: Do not paint exposed cable, conduit, raceways, trays, or racks unless indicated.

## 3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

## 3.5 PAINTING SCHEDULES, GENERAL

## A. Abbreviations

- |    |     |                                   |
|----|-----|-----------------------------------|
| 1. | EXT | Exterior                          |
| 2. | FL  | Flat                              |
| 3. | GL  | Gloss                             |
| 4. | INT | Interior                          |
| 5. | LS  | Low Sheen                         |
| 6. | MPI | Master Painters Institute         |
| 7. | MRP | Manufacturer's Recommended Primer |
| 8. | SG  | Semigloss                         |
| 9. | WB  | Water Based                       |

## B. Paint System Legend:

|    | <u>MPI</u><br><u>Code</u> | <u>Gloss</u><br><u>Level</u> | <u>Finishing</u><br><u>System</u> | <u>Primer</u> | <u>Topcoat</u> |
|----|---------------------------|------------------------------|-----------------------------------|---------------|----------------|
| 1. | <b>EXT 3.1A</b>           | LS                           | Latex                             | MPI #10       | MPI #10        |

- C. MPI Paint Grade: Provide a Premium (2 topcoats) grade paint system for paint systems scheduled in Part 3 unless indicated otherwise.

### 3.6 EXTERIOR PAINTING SCHEDULE

A. Cementitious Composition Board (Cementitious Siding, Trim, Panels, Etc.)

- |    |                                                                                |    |       |         |         |
|----|--------------------------------------------------------------------------------|----|-------|---------|---------|
| 1. | <b>EXT 3.3A</b>                                                                | FL | Latex | MPI #10 | MPI #10 |
| 2. | <b>EXT 3.3A</b>                                                                | LS | Latex | MPI #15 | MPI #15 |
| 3. | Coordinate touch-up of prefinished panels with manufacturer's recommendations. |    |       |         |         |

B. Structural Steel and Metal Fabrications (Columns, Beams, Joists, Bollards, Handrails, Posts and Railings, Etc.)

- |    |                  |    |            |          |          |
|----|------------------|----|------------|----------|----------|
| 1. | <b>EXT 5.1BB</b> | LS | W.B. Alkyd | MPI #107 | MPI #168 |
| 2. | <b>EXT 5.1BB</b> | SG | W.B. Alkyd | MPI #107 | MPI #169 |

C. Hollow Metal Doors and Frames (Exterior)

- |                                                                       |                 |    |                               |          |
|-----------------------------------------------------------------------|-----------------|----|-------------------------------|----------|
| 1.                                                                    | <b>EXT 5.1M</b> | LS | W.B. Alkyd (Over Shop Primer) | MPI #168 |
| (Note: Paint interior side of exterior doors with same paint system.) |                 |    |                               |          |

D. Gypsum Board (Exterior Gypsum Board for Soffits)

- |    |                 |    |       |        |         |
|----|-----------------|----|-------|--------|---------|
| 1. | <b>EXT 9.2A</b> | FL | Latex | MPI #6 | MPI #10 |
| 2. | <b>EXT 9.2A</b> | LS | Latex | MPI #6 | MPI #15 |

### 3.7 INTERIOR PAINTING SCHEDULE

A. Structural Steel and Metal Fabrications (Columns, Beams, Joists, Other Non-Galvanized Steel)

- |    |                                                                                     |    |                                     |          |          |
|----|-------------------------------------------------------------------------------------|----|-------------------------------------|----------|----------|
| 1. | <b>INT 5.1W</b>                                                                     | LS | W.B. Alkyd (Shop-applied Primer)    | MPI #168 |          |
| 2. | <b>INT 5.1W</b>                                                                     | SG | W.B. Alkyd (Shop-applied Primer)    | MPI #169 |          |
| 3. | Select from <b>ABOVE</b> for primed steel. Select from <b>BELOW</b> for bare steel. |    |                                     |          |          |
| 4. | <b>INT 5.1S</b>                                                                     | LS | W.B. Alkyd (Rust Inhibitive Primer) | MPI #107 | MPI #168 |
| 5. | <b>INT 5.1S</b>                                                                     | SG | W.B. Alkyd (Rust Inhibitive Primer) | MPI #107 | MPI #169 |

B. Hollow Metal Doors and Frames (Interior)

- |    |                 |    |                               |          |
|----|-----------------|----|-------------------------------|----------|
| 1. | <b>INT 5.1W</b> | LS | W.B. Alkyd (Over Shop Primer) | MPI #168 |
|----|-----------------|----|-------------------------------|----------|

C. Dressed Lumber (Including Doors, Door and Window Frames, Moldings, Paneling, Casework, Etc.)

- |    |                  |    |            |         |          |
|----|------------------|----|------------|---------|----------|
| 1. | <b>INT 6.3BB</b> | LS | Alkyd W.B. | MPI #39 | MPI #168 |
| 2. | <b>INT 6.3BB</b> | SG | Alkyd W.B. | MPI #39 | MPI #169 |

D. Plaster and Gypsum Board (Gypsum Wallboard & Texture Finishes, Etc.)

- |    |                 |    |                             |         |         |
|----|-----------------|----|-----------------------------|---------|---------|
| 1. | <b>INT 9.2A</b> | FL | Latex (Latex Primer/Sealer) | MPI #50 | MPI #53 |
| 2. | <b>INT 9.2A</b> | LS | Latex (Latex Primer/Sealer) | MPI #50 | MPI #52 |

END OF SECTION 099100

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## SECTION 101423 – PANEL SIGNAGE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Panel signs.
  - 2. Code required signage.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
  - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
  - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
  - 1. Panel Signs: Full-size Samples of each type of sign required.
  - 2. Approved samples will not be returned for installation into Project.
- D. Sign Schedule: Use same designations indicated on Drawings.

#### 1.3 QUALITY ASSURANCE

- A. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- B. Regulatory Requirements:
  - 1. Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1
  - 2. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:

- a. Illuminated Exit Signs: See Division 26 Section "Interior Lighting"
- b. Room Capacity: Provide a sign for every room or space that is an assembly or education occupancy of over 50 occupants displaying the occupant load of the room or space. Post in a conspicuous place, near the main exit access doorway from the room or space.
- c. Storage Signs: Provide signs at mechanical/electrical rooms to read "COMBUSTIBLE STORAGE NOT PERMITTED."
- d. Tactile Exit Signs: Provide tactile signs stating "EXIT" and complying with ADAAG placed adjacent to each door to an egress stairway, an exit passageway, and the exit discharge.
- e. Signs for Accessible Spaces
  - 1) Provide directional signage identified by the International Symbol of Accessibility indicating the route to the nearest like accessible element at the following locations:
    - a) Inaccessible building entrances.
    - b) Inaccessible public toilet and bathing facilities.
    - c) Elevators not serving an accessible route.
    - d) At each separate sex toilet and bathing room indicating the location of the nearest accessible unisex toilet or bathing room.
    - e) At exits and elevators serving a required accessible space, but not providing an approved accessible means of egress.
  - 2) Provide signage indicating special accessibility provisions as follows:
    - a) In assembly areas required to have an assistive listening system, a sign notifying the general public of availability of assistive listening systems.
    - b) At areas of refuge.
    - c) At areas of assisted rescue.

#### 1.4 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

### PART 2 - PRODUCTS

#### 2.1 PANEL SIGNS

- A. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with requirements as indicated on Drawings.
  - 1. Materials, Sizes, and Text: As indicated on Drawings.
  - 2. Mounting: Unframed.
    - a. Wall mounted with concealed anchors or two-face tape.

- b. Manufacturer's standard anchors for substrates encountered.
- 3. Color: As indicated on Drawings.

## 2.2 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
  - 1. Sign Mounting Fasteners:
    - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
    - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

## 2.3 FINISHES, GENERAL

- A. Protect mechanical 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 the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.4 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: Provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for a minimum of three years for application intended.

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



### 3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
  - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
  - 3. Mounting Heights: As indicated on Drawings.
  - 4. Location: As indicated on Drawings.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
  - 1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
  - 2. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
  - 3. Shim Plate Mounting: Provide 1/8-inch-thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
  - 4. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

### 3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101423

SECTION 102600 - WALL AND DOOR PROTECTION **- NOT FULLY EDITED**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall guards.
2. Corner guards.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for steel angle corner guards.
2. Section 057300 "Decorative Metal Railings" for metal handrails without plastic bumpers.
3. Section 064023 "Interior Architectural Woodwork" for solid-wood handrails, bumper rails, chair rails, or corner moldings without plastic bumpers.
4. Section 087100 "Door Hardware" for metal and plastic protective trim units, according to BHMA A156.6, used for armor, kick, mop, and push plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, **12 inches (300 mm)** long.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Material certificates.

C. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.

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

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
  2. Smoke-Developed Index: 450 or less.

### 2.2 WALL GUARDS

- A. Rub Rail **<Insert drawing designation>**: Standard-duty[, **PVC-free**] assembly consisting of continuous snap-on cover installed over concealed, continuous retainer.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  2. Cover: Extruded plastic, minimum **0.078-inch (2.0-mm)** wall thickness; in dimensions and profiles indicated on Drawings.
    - a. Color and Texture: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] **<Insert color and texture>**.
  3. Retainer: Minimum **0.0625-inch- (1.6-mm-)** thick, one-piece, extruded aluminum.
  4. End Caps and Corners: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
  5. Accessories: Concealed splices and mounting hardware.
  6. Mounting: [Surface mounted directly to wall] [Reveal mounted on bumper cushions].

### 2.3 CORNER GUARDS

Copy paragraphs below and re-edit for each product.

Insert drawing designation for each product required. Use these designations on Drawings to identify each product.

- A. Surface-Mounted, Plastic-Cover Corner Guards **<Insert drawing designation>**: Manufacturer's standard[, **PVC-free**] assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
  2. Cover: Extruded rigid plastic, minimum [**0.078-inch (2.0-mm)**] [**0.100-inch (2.5-mm)**] **<Insert dimension>** wall thickness; in dimensions and profiles indicated on Drawings.
    - a. Color and Texture: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] **<Insert color and texture>**.

Retain "Continuous Retainer" or "Retainer Clips" Subparagraph below.

3. Continuous Retainer: [**Minimum 0.060-inch- (1.5-mm-) thick, one-piece, extruded aluminum**] [**One-piece extruded plastic**].
  4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
  5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
- B. Surface-Mounted, Opaque-Plastic Corner Guards <Insert drawing designation>: Fabricated as one piece from [**PVC plastic**] [**PVC-free plastic**] [**acrylic-modified vinyl sheet**] [**or**] [**opaque polycarbonate sheet**]; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.
1. <Double click here to find, evaluate, and insert list of manufacturers and products.>
  2. Mounting: [**Countersunk screws through factory-drilled mounting holes**] [**Adhesive**].
  3. Color and Texture: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <Insert color and texture>.

## 2.4 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of **15 ft.-lbf/in. (800 J/m)** of notch when tested according to ASTM D256, Test Method A.
- C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- D. Adhesive: As recommended by protection product manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than **20 feet (6.1 m)**, splice aluminum retainers and plastic covers at different locations along the run, but no closer than **12 inches (305 mm)** apart.
3. Adjust end and top caps as required to ensure tight seams.

END OF SECTION 102600

## SECTION 102813 - TOILET AND BATH ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Residential unit bathroom accessories.
3. Under sink guards.

B. Related Requirements:

1. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.
2. Refer to Section 088000 "Glazing" for custom size mirrors.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: Full size, for each exposed product and for each finish specified.
- C. Maintenance data.

### PART 2 - PRODUCTS

#### 2.1 TOILET AND BATH ACCESSORIES

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Toilet Accessory Schedule at the end of Part 3 or a substitution approved by Architect.

#### 2.2 UNDER SINK GUARDS

A. Under Sink and Lavatory Guard:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Buckaroos, Inc.
  - b. Plumberex Specialty Products, Inc.
  - c. Truebro by IPS Corporation.

2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.

## 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.

### 3.3 PUBLIC (COMMON AREA) TOILET ACCESSORY SCHEDULE

| Item | Description             | Mfr.    | Style          | Finish         | No.    |
|------|-------------------------|---------|----------------|----------------|--------|
| T-1  | Grab Bars               | Bobrick | Classic Series | Brushed Chrome | B-6806 |
| T-2  | Toilet Tissue Dispenser | Bobrick | Classic Series | Brushed Chrome | B-2888 |
| T-3  | Soap Dispenser          | Bobrick | Classic Series | Black ABS      | B-40   |
| T-4  | Mirror                  | Bobrick | Classic Series | Brushed Chrome | B-165  |
| T-5  | Coat Hook               | Bobrick | Classic Series | Brushed SS     | B-6827 |
| T-7  | Paper Towel Dispenser   | Bobrick | Classic Series | Brushed Chrome | B-3942 |

### 3.4 RESIDENTIAL UNIT BATHROOM ACCESSORY SCHEDULE

| Item | Description                 | Mfr.    | Collection | No.                                         | Finish        |
|------|-----------------------------|---------|------------|---------------------------------------------|---------------|
| T-11 | Grab Bar, Size as indicated | Bobrick | Classic    | B-6808                                      | Brushed SSTL  |
| T-12 | Toilet Tissue Dispenser     | Moen    | Mason      | (2) YB8000BC posts w/<br>YB8099SN roller    | Satin Nickel  |
| T-13 | Shower Rod, Straight        | Moen    | -          | TR1001BN                                    | Satin Nickel  |
| T-14 | Grab Bar, Size as indicated | Bobrick | Classic    | B-6808                                      | Brushed SSTL  |
| T-15 | Towel Bar, 18"              | Moen    | Mason      | (2) YB8000BC posts w/<br>YB8098SN towel bar | Satin Nickel  |
| T-16 | Robe Hook                   | Moen    | Mason      | YB8003SN                                    | Satin Nickel  |
| T-17 | Shower Seat                 | Bobrick | -          | B-5191                                      | Phenolic+SSTL |

END OF SECTION 102813



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## SECTION 104116 - EMERGENCY KEY CABINETS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Key boxes
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, accessories, dimensions of individual components and profiles, and finishes.

#### 1.3 QUALITY ASSURANCE

- A. Provide UL listed unit.
- B. Provide units approved by local fire department.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the Knox Company or a substitution approved by Architect prior to date for receipt of Bids.
- B. Basis-of-Design Product: Knox Company; 3270 Series Knox-Box.
  - 1. Verify product meets requirements of local fire department.

#### 2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.

#### 2.3 KEY BOXES

- A. Construction:

1. 1/4-inch steel housing.
  2. 1/2-inch steel plate door with interior gasket seal.
    - a. Door operation: Hinged
  3. Mounting: Recessed
  4. Dimensions: 7-inches high by 7-inches wide by 3-1/4-inches deep
  5. Lock:
    - a. UL listed.
    - b. Double action rotating tumblers
    - c. Hardened steel pins
    - d. 1/8-inch dust cover.
  6. Minimum Key Capacity: 5
- B. Accessories:
1. Recessed mounting kit
- C. Finish
1. Pre-treatment: Zinc-phosphate to Federal Standard TTC 490 Type II
  2. Final Coating: Weather resistant interior and exterior TGIC polyester power coat
  3. Color: Black

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: Install key-box as required for a complete installation per manufacturer's written instructions.

#### 3.2 ADJUSTING AND CLEANING

- A. Adjust locks and doors for proper operation.
- B. Restore marred, abraded surfaces to their original condition.

END OF SECTION 104116

## SECTION 104400 - FIRE-PROTECTION SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Portable fire extinguishers.
  - 2. Fire-protection cabinets for portable fire extinguishers.
  - 3. Mounting brackets for fire extinguishers not in cabinets.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
  - 1. Fire Extinguishers: Include rating and classification.
  - 2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Samples: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of cabinet finish indicated.

#### 1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
  - 1. Provide extinguishers listed and labeled by FM.

#### 1.4 COORDINATION

- A. Coordinate depth of cabinets to ensure that they will fit in walls where indicated. Do not purchase cabinets until this coordination is complete.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or by substitution approved by Architect prior to bid date:
1. Portable Fire Extinguishers:
    - a. Ansul Incorporated.
    - b. J.L. Industries, Inc.
    - c. Kidde: Walter Kidde, The Fire Extinguisher Co.
    - d. Larsen's Manufacturing Company.
    - e. Potter-Roemer; Div. of Smith Industries, Inc.
    - f. Watrous; Div. of American Specialties, Inc.
  2. Fire-Protection Cabinets:
    - a. J.L. Industries, Inc.
    - b. Larsen's Manufacturing Company.
    - c. Potter-Roemer; Div. of Smith Industries, Inc.
    - d. Watrous; Div. of American Specialties, Inc.

## 2.2 PORTABLE FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.
- B. Multipurpose Dry-Chemical Type: UL-rated 4A-80B:C, 10-lb nominal capacity, in enameled-steel container.

## 2.3 FIRE-PROTECTION CABINETS

- A. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
1. Fire-Rated Cabinets: Listed and labeled to meet requirements of ASTM E 814 for fire-resistance rating of wall where it is installed.
    - a. Construct fire-rated cabinets with double walls fabricated from 0.0478-inch-thick, cold-rolled steel sheet lined with minimum 5/8-inch-thick, fire-barrier material.
    - b. Provide factory-drilled mounting holes.
- B. **FPC-1:** Fire-Protection Cabinet:
1. Basis of Design: Larsen's Manufacturing Co.; 2409-6R.
  2. Type: Fire extinguisher.

3. Mounting: Semi-recessed.
4. Cabinet Projection: 2-1/2 inches.
5. Rough Opening Depth: 4 inches.
6. Cabinet Tub:
  - a. Material: Enameled-steel sheet, white.
7. Trim:
  - a. Style: Exposed, rolled edge.
  - b. Material: Aluminum sheet.
  - c. Finish: Clear anodic.
8. Door:
  - a. Style: Vertical Duo
  - b. Material: Aluminum sheet.
  - c. Door Glazing: Acrylic.
  - d. Finish: Clear anodic.
9. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle
10. Identification: Die cut lettering, vertical orientation, white.

C. **FPC-2:** Fire-Rated Fire-Protection Cabinet:

1. Basis of Design: Larsen's Manufacturing Co.; FS-2409-R4.
2. Type: Fire extinguisher.
3. Mounting: Semi-recessed.
4. Cabinet Projection: 3-1/2 inches.
5. Rough Opening Depth: 4 inches.
6. Cabinet Tub:
  - a. Material: Enameled-steel sheet, white.
7. Trim:
  - a. Style: Exposed, rolled edge.
  - b. Material: Aluminum sheet.
  - c. Finish: Clear anodic.
8. Door:
  - a. Style: Vertical Duo
  - b. Material: Aluminum sheet.
  - c. Door Glazing: Acrylic.
  - d. Finish: Clear anodic.
9. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

10. Identification: Die cut lettering, vertical orientation, white.

## 2.4 MOUNTING BRACKETS

- A. Mounting Brackets (For fire extinguishers not in cabinets): Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
  2. Orientation: Vertical.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in for hose valves, hose racks, and cabinets to verify actual locations of piping connections before cabinet installation.
- B. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets are to be installed.
- C. Examine fire extinguishers for proper charging and tagging.
  1. Remove and replace damaged, defective, or undercharged units.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing fire-protection specialties.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
  1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
  2. Fasten mounting brackets to structure and cabinets, square and plumb.
  3. Fasten cabinets to structure, square and plumb.
  4. Install fire-rated cabinets in fire-rated walls as required.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

**3.3 ADJUSTING, CLEANING, AND PROTECTION**

- A. Adjust cabinet doors that do not swing or operate freely.
- B. Refinish or replace cabinets and doors damaged during installation.
- C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 104400



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## SECTION 105500 - USPS-DELIVERY POSTAL SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Mail receptacles.
  - 2. Parcel lockers.
  - 3. Accessories.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For postal specialties. Include plans, elevations, sections, and attachment details.
- C. Samples: For each type of exposed finish.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Furnish lock keys according to USPS requirements; with temporary identification for their respective locks, bagged, and securely taped inside the collection compartment for shipping.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of postal specialties that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturer's: Subject to compliance with requirements, provide products by one of the following:
  - 1. 2B Global Inc.
  - 2. AF Florence Manufacturing Company; Gibraltar Industries.
  - 3. Salisbury Industries.
- B. Source Limitations: Obtain postal specialties products from single source from single manufacturer unless indicated otherwise.

### 2.2 MAIL RECEPTACLES

- A. Front-Loading Mail Receptacles: USPS-STD-4C; consisting of multiple compartments with fixed, solid compartment backs, enclosed within a recessed wall box.
  - 1. Front-Loading Master Door: Fabricated from extruded aluminum and braced and framed to hold compartment doors; prepared to receive master-door lock.
    - a. Master-Door Lock: Door prepared to receive lock provided by local postmaster.
  - 2. Compartments:
    - a. Basis of Design: Salisbury; as indicated on Drawings.
  - 3. Compartment Doors: Fabricated from extruded aluminum. Equip each with lock and tenant identification as required by USPS-STD-4C. Provide mail slot in the compartment with master-door lock.
    - a. Compartment-Door Locks: USPS-L-1172C; with three keys for each compartment door.
    - b. Parcel-Locker-Compartment-Door Locks: Two-key security system in which control key provides access to parcel-locker-compartment key, which opens compartment and is retained once opened.
  - 4. Frames: Extruded aluminum or aluminum sheet; ganged and nested units, with cardholder and blank cards for tenant's identification within each compartment.
  - 5. Concealed Components and Mounting Frames: Aluminum or steel sheet.
  - 6. Exposed Aluminum Finish:
    - a. Baked-Enamel or Powder-Coated Finish: Aluminum

### 2.3 FABRICATION

- A. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal

edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.

- B. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly.
- C. Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Mail Receptacles: Install mail receptacles with center of tenant-door lock cylinders and bottom of compartments at the maximum and minimum heights above finished floor established by the USPS and manufacturer's written instructions.

#### 3.2 FIELD QUALITY CONTROL

- A. Arrange for USPS personnel to examine and test postal specialties served by the USPS after they have been installed according to USPS regulations.

END OF SECTION 105500.13

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## SECTION 105723 - WIRE CLOSET AND UTILITY SHELVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Wardrobe and closet organizers including integrated system of support, brackets, shelving, and accessories.

- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wire items.
- B. Shop Drawings: Elevations, sections and details indicating product by description and product item part number. Materials schedule for each location of installation.
- C. Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

#### 1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain wire mesh items from single source from single manufacturer.

#### 1.4 PROJECT 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 one of the following:
1. Schulte Corp.
  2. Rubbermaid, Inc.
  3. ClosetMaid, a division of Emerson Electric Co.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Back clips spaced 11 inches (279 mm) with support braces at 3 feet 6 inches (1067 mm).
  - 1. Static Load: 75 lb/ft (115 kg/m) of shelf minimum.
  - 2. For heavy duty applications in pantry applications space support brace on 2 feet (610 mm).
  - 3. Back Clips and Down Back Clips: Manufacturer's standard hollow wall anchoring system.
- B. Down Back Clips shall be installed above every support brace.

## 2.3 MATERIALS

- A. Steel Rod: Grade C 1008 cold drawn steel rod. Tensile strength of 100 ksi.
- B. Front Rods and Studs: 0.306 inch (7.8 mm) diameter.
- C. Back Rods: 0.243 inch (6.2 mm) diameter.
- D. Cross Wires:
  - 1. 1 inch (25.4 mm) spacing: 0.120 inch (3 mm) diameter for one inch spaced standard 20 inches (508 mm) shelf. 0.120 inch (3 mm) diameter for one inch spaced standard mesh shelf.
  - 2. 1/2 inch (12.7 mm) spacing: 0.0915 inch (2.3 mm) diameter for one-half inch spaced tight mesh shelf.

## 2.4 COMPONENTS:

- A. Shelving Types:
  - 1. Clothes Rod and Shelf: 12 inches deep with continuous slide rod.
- B. Accessories:
  - 1. Support Brace: Maximum 42 inches (1067 mm) and every open end.
  - 2. Side Wall Bracket: As scheduled or as required. Shelf side wall interface.
  - 3. Back Clips: As scheduled or as required. 11 inches (280 mm) apart and 1-1/2 inches (38 mm) from each side wall.
  - 4. Fasteners, clips, caps and touch-up all as required or indicated.
  - 5. Down Back Clips: Installed over every support brace.

## 2.5 FABRICATION

- A. General: Fabricate wire closet and utility shelving from components of sizes not less than those indicated. Use larger-sized components as recommended by wire closet and utility shelf manufacturer. As required for complete installation, provide bolts, hardware, and accessories with manufacturer's standard finishes.

- B. Assemble shelves in shop. Do not splice shelving units together unless required length is longer than available shelving lengths.

## 2.6 FINISH

- A. Finish: Electrostatic applied oven cured epoxy at all surfaces to 3 to 5 mil thickness.
  - 1. Color: White.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates and supporting structure and concealed blocking have been properly installed.
- B. Framing, reinforcement and anchoring devices are correct type and are located in accordance with shop drawings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install wire closet and utility shelving in accordance with manufacturer's instructions.
- B. Install components true to line, square with adjacent components.
- C. Space clips and brackets to comply with structural performance requirements.

### 3.3 PROTECTION

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

END OF SECTION 105723



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## SECTION 113100 - RESIDENTIAL APPLIANCES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Installation of Owner furnished appliances.
  - 1. Cooking appliances.
  - 2. Kitchen exhaust ventilation.
  - 3. Refrigeration appliances.
  - 4. Laundry
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### 2.2 RESIDENTIAL APPLIANCES

- A. Appliances: Owner furnished. Reference Drawings for product information.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Utilities: Comply with plumbing and electrical requirements.

#### 3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
  2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
  3. Operational Test: After installation, start units to confirm proper operation.
  4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- C. Prepare test and inspection reports.

END OF SECTION 113100

## SECTION 122113 - HORIZONTAL LOUVER BLINDS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Horizontal louver blinds with polymer slats.

- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

### PART 2 - PRODUCTS

#### 2.1 HORIZONTAL LOUVER BLINDS, POLYMER SLATS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Norman Window Fashions; Performance Faux Wood Blinds or a comparable product approved by Owner.
- B. Flame-Resistance Rating: Comply with NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Slats: Polymers that are lead free, UV stabilized, integrally colored, opaque, and will not crack or yellow; antistatic, dust-repellent treated.
1. Width: 1 inch.
  2. Thickness: Manufacturer's standard.

3. Features:
    - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
  - D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrail fully encloses operating mechanisms on three sides and ends.
    1. Manual Lift Mechanism:
      - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within full operating range.
      - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
    2. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
      - a. Tilt: Full.
      - b. Operator: Clear-plastic wand.
    3. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
    4. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard unless otherwise indicated.
  - E. Bottom Rail: Secures and protects ends of ladders and lift cords.
    1. Type: Manufacturer's standard.
  - F. Ladders: Braided cord.
  - G. Valance: Manufacturer's standard.
  - H. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
  - I. Colors, Textures, Patterns, and Gloss:
    1. Slats: White
    2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.
- ## 2.2 HORIZONTAL LOUVER BLIND FABRICATION
- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
  - B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
  1. Locate so exterior slat edges are not closer than 2 inches from interior faces of glass and not closer than 1-1/2 inches from interior faces of glazing frames through full operating ranges of blinds.
  2. Install mounting and intermediate brackets to prevent deflection of headrails.
  3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.
- B. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.
- C. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

END OF SECTION 122113

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## SECTION 123530 - RESIDENTIAL CASEWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes:
  - 1. Dwelling unit kitchen and vanity cabinets.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Cabinets.
  - 2. Cabinet hardware.
- B. Shop Drawings: Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, and hardware.
- C. Samples: For cabinet finishes.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For casework.

### PART 2 - PRODUCTS

#### 2.1 CABINETS

- A. Quality Standard: Provide cabinets that comply with KCMA A161.1.
  - 1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with the above standard.
- B. Face Style: Flush overlay, mortise and tenon.
- C. Cabinet Style: Face frame.
- D. Door and Drawer Fronts: Solid-wood stiles and rails, 3/4 inch thick, with 3/16 inch thick, veneer-faced MDF or engineered wood core.



- E. Face Frames: 3/4-by-1-5/8-inch solid wood.
- F. Exposed Cabinet End Finish: As selected by Owner.

## 2.2 CABINET MATERIALS

### A. General:

- 1. Adhesives and Composite Wood and Agrifiber Products: Do not use products that contain urea formaldehyde.
- 2. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- 3. Hardwood Lumber: Kiln dried to 7 percent moisture content.
- 4. Softwood Lumber: Kiln dried to 10 percent moisture content.
- 5. Hardwood Plywood: HPVA HP-1.
- 6. MDF: ANSI A208.2, Grade MD; made with binder containing no urea formaldehyde.

### B. Exposed Materials:

- 1. Exposed Wood Species: As selected by Owner.
  - a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
  - b. Stain and Finish: As selected by Owner.
- 2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
- 3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.

### C. Semiexposed Materials: Unless otherwise indicated, provide the following:

- 1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces or stained to be compatible with exposed surfaces.
- 2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces.
- 3. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with NEMA LD 3, Grade VGS.
- 4. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper.

### D. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; MDF; or hardboard.

**2.3 CABINET HARDWARE**

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as selected by Architect from manufacturer's full range.
- B. Pulls: Back-mounted decorative pulls or knobs. Provide ANSI 117.1 compliant pulls for accessible units.
- C. Hinges: Concealed European-style, self-closing hinges.
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Install cabinets with no variations in flushness of adjoining surfaces; use concealed shims. Where cabinets abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match cabinet face.
- B. Install cabinets without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.
- C. Install cabinets level and plumb to a tolerance of 1/8 inch in 8 feet.
- D. Fasten cabinets to adjacent units and to backing.
  - 1. 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.

**3.2 ADJUSTING AND CLEANING**

- A. Adjust cabinets and hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

END OF SECTION 123530

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## SECTION 123661.19 - QUARTZ AGGLOMERATE COUNTERTOPS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Quartz agglomerate countertops.
2. Quartz agglomerate backsplashes.
3. Quartz agglomerate end splashes.
4. Quartz agglomerate apron fronts.

B. Reference Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 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.

C. Samples: For each type of material exposed to view.

### 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 ISFA 3-01.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Cambria.
  - b. E.I. duPont de Nemours and Company.
  - c. Technistone USA, Inc.
  - d. Terrazzo & Marble Supply Companies.
  - e. Vicostone USA.
  - f. Wilsonart LLC.

2. Colors and Patterns: 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 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: Straight, slightly eased at top.
  - 2. Backsplash: Straight, slightly eased at corner.
  - 3. End Splash: Matching backsplash.
  - 4. Overhang (exposed corners): provide radiused edge as indicated on Drawings
- C. Countertops: 2-cm (7/8-inch) thick, quartz agglomerate.
- D. Backsplashes: 2-cm (7/8-inch) thick, quartz agglomerate.
- E. Joints:
  - 1. Fabricate countertops without joints to greatest extent possible.
  - 2. Fabricate countertops in sections (only where required) for joining in field, with joints at locations coordinated via Submittal.
- 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.

## 2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by quartz agglomerate manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer.
- B. At locations using a wood panel subtop:

1. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
  2. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions.
- C. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- D. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.
- E. Install aprons to backing and countertops with adhesive.
- F. 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.
- G. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.19

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## SECTION 142100 - ELECTRIC TRACTION ELEVATORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes electric traction passenger elevators.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- 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. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples: For finishes involving color selection.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as indicated on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
- 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 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. Warranty: Submit manufacturer/installer's standard warranty.



## 1.5 FIELD CONDITIONS

### A. Temporary Electrical Power:

1. Owner will arrange for temporary 220 VAC, single-phase, 60 Hz., GFCI-protected electricity to be available for installation of elevator components.

### B. Installation of the Elevator:

1. Provide permanent three-phase power prior to installation start.
2. Provide clear, rollable access to a 20 foot by 10 foot secure and dry storage area prior to delivery.
3. Provide a clean, dry, and complete hoistway along with temporary installation platform and all required OSHA-compliant barricades prior to delivery.

### C. Temporary Use of Elevator:

1. Owner will negotiate with manufacturer/installer for temporary use of elevator during the remainder of construction.
2. Temporary use of elevator shall be in accordance with terms and conditions of manufacturer/installer's temporary acceptance form.

## PART 2 - PRODUCTS

### 2.1 ELEVATOR MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Otis Elevator Company; 'GEN3 EDGE' MRL** traction passenger elevator or comparable product by one of the following:

1. KONE Inc.
2. Schindler Elevator Corp
3. TK Elevator Company.

- B. Source Limitations: Obtain elevators from a single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with requirements for accessible elevators in the United States Access Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

### 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. Quantity: One
2. Machine Type: Gearless traction.
3. Rated Load: **3500 lb.**
4. Rated Speed: **200 fpm.**
5. Counterweight Location: Side
6. Machine Location: Top of the hoistway mounted on car and counterweight guide rails.
7. Control Space Location: Top landing entrance frame or entrance frame at one floor below the top landing.
8. Travel: 45 feet 5-5/8 inches.
9. Landings: 6
10. Front Openings: 6
11. Rear Openings: 0
12. Operation: Simplex Collective Operation..
13. Clear Inside Dimensions: 5 feet 6-1/8 inches deep by 6 feet 5-9/16 inches wide.
14. Cab Height: 7 feet 9 inches.
15. Entrance Type and Width: Two Speed Side Opening 3 feet 6 inches wide .
16. Entrance Height: 7 feet 0 inches.
17. Power Supply: 208 Volts 3 Phase 60 Hz.

## C. Performance:

1. Car Speed: Minus 10 percent to plus 5 percent of contract speed under any loading condition or direction of travel.
2. Car Capacity: Safely lower, stop and hold up to 125 percent of rated load per code.

## D. Ride Quality:

1. Vertical Vibration (maximum): 25 mg.
2. Horizontal Vibration (maximum): 15 mg.
3. Vertical Jerk (maximum): 2 ft/sec<sup>3</sup>.
4. Acceleration (maximum): 1.6 ft/sec<sup>2</sup>.
5. In Car Noise: 53-60 dB(A).
6. Stopping Accuracy: ±5mm.
7. Starts per hour (maximum): 180.

## E. Elevator Operation:

1. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. When all calls have been answered, the car shall park at the last landing served.

## F. Operating Features, Standard:

1. Door Light Curtain Protection.
2. Static AC Drive.
3. Phase Monitor Relay.
4. Cab Overload with Indicator.
5. Load-weighing.
6. Central Alarm.

7. Remote Monitoring.
8. Firefighter's Operation.
9. Automatic Evacuation.

- a. When the main line power is lost for longer than 5 seconds the emergency battery power supply provides power automatically to the elevator controller. If the car is at a floor when the power fails, it remains at that floor, opens its doors, and shuts down. If the car is between floors, it is raised or lowered to the first available landing, opens its doors, and shuts down.

- G. Operating Features, Occupant Evacuation: Comply with Section 3008 "Occupant Evacuation Elevators" of the Ohio Building Code, 2017.
- H. Security Features: Elevator shall be connected to building access control system as specified in Section 281521 "Telephone entry and Access Control." System shall restrict user and guest access to floors as programmed in the access control software.

## 2.4 CONTROL COMPONENTS AND CONTROL SPACE

- A. Controller: Provide microprocessor-based control system to perform all of the functions of safe elevator operation, as well as perform car and group operational control.
  1. High voltage (110v or above) contact points inside the inspection and test panel shall be protected from accidental contact in a situation where the access panels are open.
  2. The controller shall be distributed throughout the elevator system located in the overhead, cab and inspection and test panel. The inverter will be mounted in the overhead adjacent to the hoist machine and an inspection and test panel will be located in the door jamb at the top floor or one floor below the top floor. No elevator equipment mechanical rooms or closets are required.
  3. Provide multi-bus control architecture to reduce cabling, material and waste.
- B. Drive: Provide a Variable Voltage Variable Frequency AC Closed Loop drive system. Provide stable start without high peak current, quickly reaching a low energy consumption level.
- C. Inspection and Test Panel: Integrated control equipment, main inspection and test panel in door frame at top level served or at one floor below the top level served.

## 2.5 EQUIPMENT: HOISTWAY COMPONENTS

- A. Machine:
  1. Gearless asynchronous AC motor with integral drive sheave, service and emergency brakes.
  2. Design machine to enable direct power transfer, thereby avoiding loss of power.
  3. Design machine to be compact, lightweight and durable to optimize material usage and save space.
  4. Mount to structural support channels on top of guide rail system as applicable in hoistway overhead.

- B. Governor:
  - 1. Tension type over-speed governor with remote manual reset.
  - 2. Mount to structural support channels as applicable in hoistway overhead.
- C. Buffers, Car and Counterweight: Compression spring type buffers to meet code.
- D. Hoistway Operating Devices:
  - 1. Emergency Stop switch in the pit.
  - 2. Terminal stopping switches.
  - 3. Emergency stop switch on the machine.
- E. Positioning System: System consisting of proximity sensors and door zone vanes.
- F. Guide Rails and Attachments: Provide Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual-purpose bracket that combines both counterweight guide rails, and one of the car guide rails to building fastening.
- G. Suspension System: Non-circular Elastomeric coated suspension media with high tensile grade steel cords.
- H. Governor Rope: Steel wire rope with 6 mm diameter.

## 2.6 HOISTWAY ENTRANCES

- A. Hoistway Doors and Frames:
  - 1. UL rated with required fire rating.
  - 2. Doors: Rigid flush panel construction with reinforcement ribs.
  - 3. Frames: Securely fasten at corners to form unit frame. Frames shall be bolted.
- B. Finish:
  - 1. Exposed Areas of Corridor Frames: Stainless Steel - All Floors
  - 2. Doors: Stainless Steel - All Floors
  - 3. Sills: Aluminum - All Floors
- C. Entrance Markings and Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

## 2.7 CAR COMPONENTS

- A. Car Frame and Safety: Provide car frame with adequate bracing to support the platform and car enclosure. The safety shall be integral to the car frame and shall be flexible guide clamp type.
- B. Platform: Provide platform of steel construction with plywood subfloor and aluminum threshold.

- C. Car Guides: Provide sliding guide shoes mounted to top and bottom of both car and counterweight frame. Arrange each guide shoe assembly to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.
- D. Provide central guiding system to reduce mechanical friction and energy consumption.
- E. Steel Cab:
  - 1. Fire Rating: Provide Class B fire rating for cab, or Class A fire rating where required by local Code.
  - 2. Car Wall Finish: Plastic laminate as selected by Owner.
  - 3. Base and Frieze: Aluminum.
  - 4. Car Front Finish: Brushed stainless steel.
  - 5. Car Door Finish: Brushed stainless steel.
  - 6. Ceiling: Canopy ceiling, finished in #4 stainless steel with down lit led lighting. Provide lighting consisting of four compact fluorescent energy saving lights located in two semi-oval lateral cutouts located on the center-sides of the cab ceiling, Lexan lens cover.
  - 7. Handrail: Straight rectangular brushed aluminum. Locate on side walls.
  - 8. Flooring: Prepared to receive flooring.
  - 9. Ventilation: Provide one-speed fan in canopy.
  - 10. Emergency Car Lighting: Provide an emergency power unit employing a 12-volt sealed rechargeable battery and static circuits to illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
  - 11. Emergency Siren: Provide siren mounted on top of the car that is activated when the alarm button in the car operating panel is engaged.
  - 12. Emergency Exit Switch: Provide an electrical contact to open the safety circuit when the emergency car top exit is opened. When the exit door is opened, the top exit switch shall signal the control and the car will be unable to move.
  - 13. Emergency Exit Lock: Provide an emergency exit lock where required by local code.
  - 14. Emergency Exit Guard: Provide emergency exit guard on top of car when required for hoistway wall to platform clearance exceeds 12 inches or for multiple cars in hoistway.

## 2.8 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.

## 2.9 SIGNAL EQUIPMENT

- A. 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 car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.

1. 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 in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28 Sections.
- 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.
  1. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified in Division 28 Sections.
- G. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide 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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine hoistways, hoistway openings, and pits before starting elevator installation.
- B. Verify hoistway, pit, overhead, and openings are of correct size, within tolerances, and are ready for work of this section.
- C. Verify walls are plumb where openings occur and ready for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.

- D. Verify hoistway is clear and plumb, with variations not to exceed -0 to +1 inch at any point. Verify projections greater than 4 inches must be beveled not less than 75 degrees from horizontal. No negative tolerance is permitted for minimum hoistway dimensions.
- E. Verify minimum 2-hour fire-resistance rating of hatch walls.
- F. Notify Architect in writing of dimensional discrepancies or other conditions detrimental to proper installation or performance of elevators.
- G. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to manufacturer/installer.

### 3.2 INSTALLATION

- A. Install elevators in accordance with manufacturer/installer's instructions and ANSI/ASME A17.1.
- B. 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.
- C. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- D. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.
- E. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- F. Locate hall signal equipment for elevators as follows unless otherwise indicated:
  - 1. Place hall lanterns either above or beside each hoistway entrance.
  - 2. Mount hall lanterns at a minimum of 72 inches above finished floor.

### 3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

### 3.4 ADJUSTING

- A. Adjust elevators for proper operation in accordance with manufacturer/installer's instructions.
- B. Adjust elevators for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- C. Adjust doors to prevent opening of doors at landing on corridor side, unless car is at rest at that landing, or is in leveling zone and stopping at that landing.

- D. Adjust automatic floor leveling feature at each floor to within 1/4 inch of landing.
- E. Repair minor damages to finish in accordance with manufacturer/installer's instructions and as approved by Architect.
- F. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

### 3.5 PROTECTION

- A. Protect installed elevators from damage during construction in accordance with the negotiated temporary use agreement between Owner and manufacturer's installer.

### 3.6 CLEANING

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

### 3.7 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 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.

END OF SECTION 142100



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## SECTION 142400 - HYDRAULIC ELEVATORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Hydraulic passenger elevators.
- B. Reference Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and large-scale details indicating service at each landing; machine room layout; coordination with building structure; relationships with other construction; and locations of equipment.
  - 2. Indicate maximum dynamic and static loads imposed on building structure at points of support as well as maximum and average power demands.
- C. Samples: For finishes involving color selection.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates: Signed by elevator manufacturer, certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
- 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 maintenance agreement, starting on date initial

maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

## 1.5 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. Warranty Period: One year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 ELEVATOR MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Otis Elevator Company 'Hydrofit'** twin-post holeless hydraulic elevator or a comparable product by one of the following:
1. KONE Inc.
  2. Schindler Elevator Corp.
  3. TK Elevator Corporation

### 2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Standard: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC A117.1.
- C. Seismic Performance: Elevator system withstands the effects of earthquake motions determined according to ASCE/SEI 7 and complies with elevator seismic requirements in ASME A17.1/CSA B44.
1. Project Seismic Design Category: B.
  2. Elevator Component Importance Factor: 1.0.
  3. Design earthquake spectral response acceleration short period (Sds) for Project is as indicated on Drawings.
  4. Provide earthquake equipment required by ASME A17.1/CSA B44.

### 2.3 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components are used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description:
1. Type: **Twin-post Holeless Hydraulic (machine-roomless).**

2. Rated Load: **2500 lb.**
3. Rated Speed: **100 fpm.**
4. Operation System: Single automatic operation.
5. Auxiliary Operations:
  - a. Automatic dispatching of loaded car.
  - b. Nuisance call cancel.
  - c. Loaded-car bypass.
  - d. Automatic operation of lights and ventilation fans.
6. Car Enclosures:
  - a. Inside Width: 80 inches from side wall to side wall.
  - b. Inside Depth: 66 inches from back wall to front wall (return panels).
  - c. Inside Height: Not less than 93 inches (7'-9") to underside of ceiling.
  - d. Front Walls (Return Panels): Satin stainless steel, ASTM A480/A480M, No. 4 finish with integral car door frames.
  - e. Car Fixtures: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
  - f. Side and Rear Wall Panels: Plastic laminate.
  - g. Door Faces (Interior): Satin stainless steel, ASTM A480/A480M, No. 4 finish.
  - h. Ceiling: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
  - i. Handrails: 1/2 by 2 inches rectangular satin stainless steel, at sides and rear of car.
  - j. Floor prepared to receive resilient flooring (specified in Section 096500 "Resilient Flooring").
7. Hoistway Entrances:
  - a. Width: 42 inches.
  - b. Height: 84 inches.
  - c. Type: Single-speed side sliding.
  - d. Frames: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
  - e. Doors: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
8. Hall Fixtures: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
9. Additional Requirements:
  - a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, ASTM A480/A480M, No. 4 finish.
  - b. Provide hooks for protective pads and one complete set(s) of full-height protective pads.

## 2.4 SYSTEMS AND COMPONENTS

- A. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
  1. Pump is tank-top-mounted type with fan-cooled, squirrel-cage induction motor, and is mounted on oil tank with vibration isolation mounts and enclosed in prime-painted steel enclosure lined with 1-inch- (25-mm-) thick, glass-fiber insulation board
  2. Motor has wye-delta or solid-state starting.
  3. Motor has variable-voltage, variable-frequency control.

- B. Hydraulic Silencers: System has hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
- C. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
  - 1. Casing for Underground Piping: Schedule 40 PVC pipe complying with ASTM D1785, joined with PVC fittings complying with ASTM D2466 and solvent cement complying with ASTM D2564.
- D. Hydraulic Fluid: Nontoxic, biodegradable, fire-resistant fluid, made from vegetable oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives, that is approved by elevator manufacturer for use with elevator equipment.
- E. Protective Cylinder Casing: PVC or HDPE pipe casing complying with ASME A17.1/CSA B44, of sufficient size to provide not less than 1-inch clearance from cylinder and extending above pit floor. Casing has means of monitoring effectiveness to comply with ASME A17.1/CSA B44.
- F. Guides: Roller guides. Provide guides at top and bottom of car frame.

## 2.5 OPERATION SYSTEMS

- A. Provide manufacturer's standard microprocessor operation system as required to provide type of operation indicated.
- B. Auxiliary Operations:
  - 1. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after 5 minutes and are re-energized before car doors open.
  - 2. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car-control stations.

## 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 causes 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 sounds and doors begin to close at reduced kinetic energy.

## 2.7 CAR ENCLOSURES

- A. Provide steel-framed car enclosures with nonremovable 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. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to manufacturer's standard honeycomb core with plastic-laminate panel backing and manufacturer's standard protective edge trim. Panels have a flame-spread index of 75 or less, when tested according to ASTM E84. Plastic-laminate color, texture, and pattern as selected by Architect from plastic-laminate manufacturer's full range.
  2. Stainless Steel Doors: Flush, hollow-metal construction; fabricated from stainless steel sheet.
  3. Sight Guards: Provide sight guards on car doors.
  4. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.
  5. Metallic-Finish, Plastic-Laminate Ceiling: Flush panels, with four low-voltage downlights in each panel. Align ceiling panel joints with joints between wall panels.
  6. Light Fixture Efficiency: Not less than 35 lumens/W.
  7. Ventilation Fan Efficiency: Not less than 3.0 cfm/W.

## 2.8 HOISTWAY ENTRANCES

- A. Fire-Rated Hoistway Entrance Assemblies: Door-and-frame assemblies 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.
  1. Fire-Protection Rating: 1 hour.
- B. Materials and Fabrication: Manufacturer's standards, but not less than the following:
  1. Stainless Steel Frames: Formed from stainless steel sheet.
  2. Stainless Steel Doors: Flush, hollow-metal construction; fabricated from stainless steel sheet.
  3. Sight Guards: Provide sight guards on doors matching door edges.
  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 C1107/C1107M.

## 2.9 SIGNAL EQUIPMENT

- A. 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 car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.
  1. 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. 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.
- E. Hall Push-Button Stations: Provide hall push-button station at each landing as indicated.
- F. Hall Lanterns: Units with illuminated arrows; however, provide single arrow at terminal landings. Provide one of the following:
  - 1. Units mounted in both jambs of entrance frame.
- G. 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.
- H. 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. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, commercial steel, Type B, exposed, matte finish.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, commercial steel, Type B, pickled.
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304.
- D. Stainless Steel Bars: ASTM A276, Type 304.
- E. Aluminum Extrusions: ASTM B221, Alloy 6063.
- F. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS or Type HGL.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. 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.
- B. Lubricate operating parts of systems as recommended by manufacturers.

- C. Leveling Tolerance: 1/4 inch, up or down, regardless of load and travel direction.
- D. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- E. Locate hall signal equipment for elevators as follows unless otherwise indicated:
  - 1. Mount hall lanterns at a minimum of 72 inches above finished floor.

### 3.2 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.

### 3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).

### 3.4 MAINTENANCE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service includes 12 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. Parts and supplies are manufacturer's authorized replacement parts and supplies.

END OF SECTION 142400



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## SECTION 149182 - TRASH CHUTES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Waste chutes.
- B. Refer to Section 018113 "Sustainable Design Requirements" for applicable sustainability requirements.

#### 1.2 DEFINITIONS

- A. Access Door: Door other than an intake or discharge door that penetrates the chase wall for service access to devices in the chase.
- B. Chase: The shaft that encloses a chute.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include diagrams for power, signal and control wiring.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of chute.
- B. Field quality control reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.6 QUALITY ASSURANCE

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Chute Source, LLC; Rubbish Chutes or a comparable product by one of the following:
  - 1. American Chute Systems, Inc.
  - 2. Midland Chutes.
  - 3. Wilkinson Hi-Rise, LLC.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing and inspecting agency, for fire-protection ratings indicated.
  - 1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
  - 2. Intake and Accesss Doors: Labeled, 1-1/2-hour fire-resistance rated with 30-minute temperature rise of 250 deg F.
- C. Discharge-Door Assemblies: Labeled, 1-1/2-hour fire-resistance rated according to NFPA 252 or UL 10B requirements for fire-rated door assemblies.
- D. 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.
- E. Standard: Provide chutes complying with NFPA 82.

### 2.3 WASTE CHUTES

- A. Chute Metal: Aluminum-coated, cold-rolled, commercial steel sheet; ASTM A463/A463M, Type 1, with not less than T1-40 coating.
  - 1. Thickness: 0.0625 inch.
- B. Chute Size: 24-inch diameter.

### 2.4 WASTE CHUTE DOORS

- A. Intake-Door Assemblies: ASTM A240/A240M, Type 304, stainless steel self-closing units with positive latch and latch handle, with stainless steel trim; constructed as required for performance requirements indicated; and with frame suitable for the enclosing chase construction.
  - 1. Door Type: Hopper.
  - 2. Size: Manufacturer's standard size for door type, chute type, and diameter indicated.

3. Finish: Manufacturer's standard satin or ASTM A480/A480M No. 3 directional polish.
  4. Latchset: Lever-handle type that unlatches door.
  5. Baffles: Rubber backdraft baffles at each intake.
- B. Discharge-Door Assemblies: Aluminum-coated steel; direct vertical-discharge type, inclined, and horizontally closing and latching; constructed as required for performance requirements indicated; and equipped with 165 deg F fusible links that cause doors to close in the event of fire.
- C. Detector System: Heat- and smoke-detecting interlock system with temperature-rise elements that locks chute doors when temperature in chute reaches a predetermined, adjustable temperature.
1. Locate smoke detector outside discharge door with solenoid to close discharge door.
- D. Access-Door Assemblies: Manufacturer's standard ASTM A240/A240M, Type 302/304, stainless steel doors with trim; constructed as required for performance requirements indicated; with frame suitable for the enclosing chase construction; in satin or ASTM A480/A480M No. 3 directional polish finish; equipped with cylinder locks that release latch with keys that are removable only when cylinder is locked.
- E. Manual Control System: Control system with manual switches that lock chute doors during shutdown hours and service operations.

## 2.5 ACCESSORIES

- A. Chute Fire Sprinklers: NFPA 13; manufacturer's standard, recessed, automatic, NPS 1/2 sprinklers; ready for piping connections.
- B. Flushing Spray Unit: NPS 3/4 spray-head unit located in chute above highest intake door, ready for hot-water piping connection, and with access door for spray-head and piping maintenance.
- C. Intake-Door Baffles: Rubber baffles, 1/8 inch thick.

## 2.6 FABRICATION

- A. Factory-assemble chutes to greatest extent practicable.
- B. Roof Vent: Extend vent to height above roofing surface as indicated on Drawings. Equip vent with full insect screening and metal explosion-release cap. Fabricate with roof-deck flange, counterflashing, and clamping ring of nonferrous metal compatible with chute metal.
- C. Chute Fire Sprinklers: Install internally within chute, recessed out of the chute area through which material travels, and according to NFPA 13.
- D. Equipment Access: Fabricate chutes with access for maintaining equipment located within the chute, such as flushing and sanitizing units, fire sprinklers, and plumbing and electrical connections.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install and test chutes before installing enclosing chase construction.
- B. Install chutes according to NFPA 82 and manufacturer's written instructions.
- C. Install chutes plumb, without obstructions that might prevent materials from free falling within chutes.
- D. Anchor flanges of chute vents to roof curbs before installing roofing and flashing. Install chute-vent counterflashing after roofing and roof-penetration flashing are installed.
- E. Test and adjust chute components after installation. Operate doors, locks, and interlock systems to demonstrate that hardware operates properly and smoothly and electrical wiring is connected correctly.
- F. Test heat- and smoke-sensing devices for proper operation.
- G. Operate sanitizing unit through one complete cycle of chute use and cleanup, and replenish chemicals or cleaning fluids in unit containers.

### 3.2 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain each chute and related equipment.

END OF SECTION 149182